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# MODERN METALS

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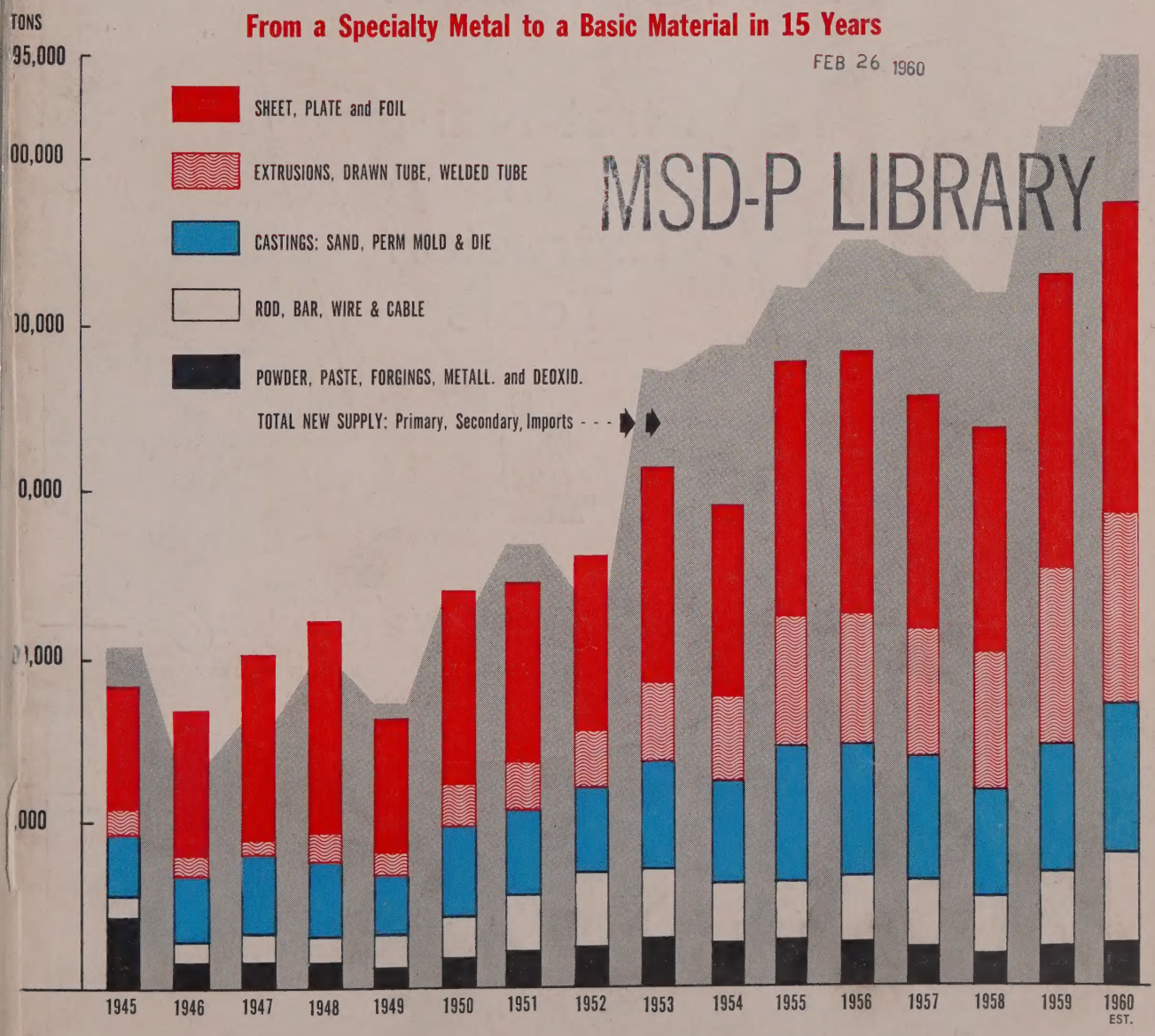
OMR

## ALUMINUM SUPPLY and SHIPMENTS

### From a Specialty Metal to a Basic Material in 15 Years

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**25,000 plants are now using 2.5 million tons of aluminum a year. Production and demand will double by 1970 if prices stay in line.**

(See pages 14 and 78)

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AJAX Steel and Forge Co.

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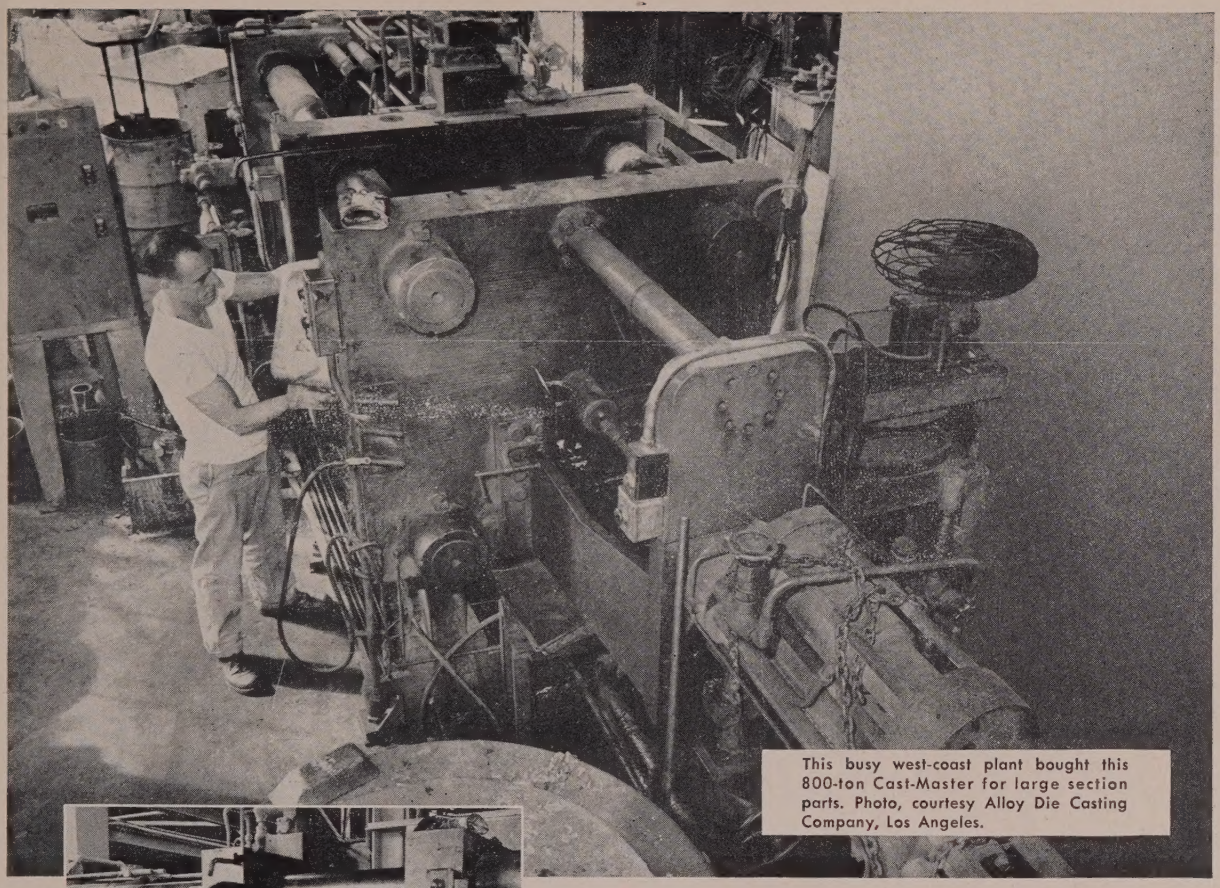
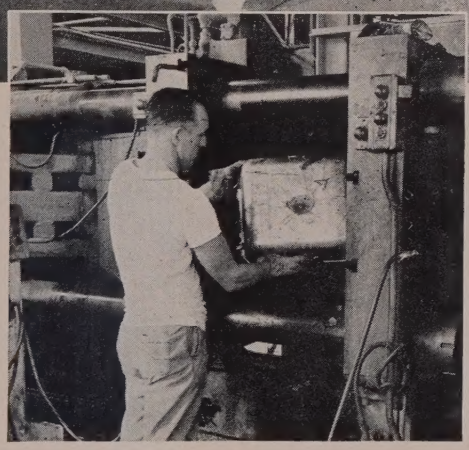


This busy west-coast plant bought this 800-ton Cast-Master for large section parts. Photo, courtesy Alloy Die Casting Company, Los Angeles.



Big, husky, thick section parts with accurate detail and true conformity to close tolerances. These machines are adjustable to all variables within its size range.

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If you're moving up into large section die castings, as typified by these views taken at Alloy Die Casting Company, Los Angeles, this 800-ton Cast-Master has much to offer. Exceedingly versatile, for so large a machine, you can rely on it for more and better die castings for an unlimited variety of jobs. This machine, or any of the Cast-Master line from 100-ton up to 2000-ton clamping force, can modernize your plant for top production. Get the facts, today. Hot or cold chamber types with interchangeable injection ends, doubles the utility of the Cast-Master machine.

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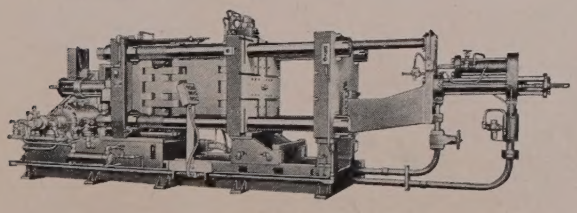

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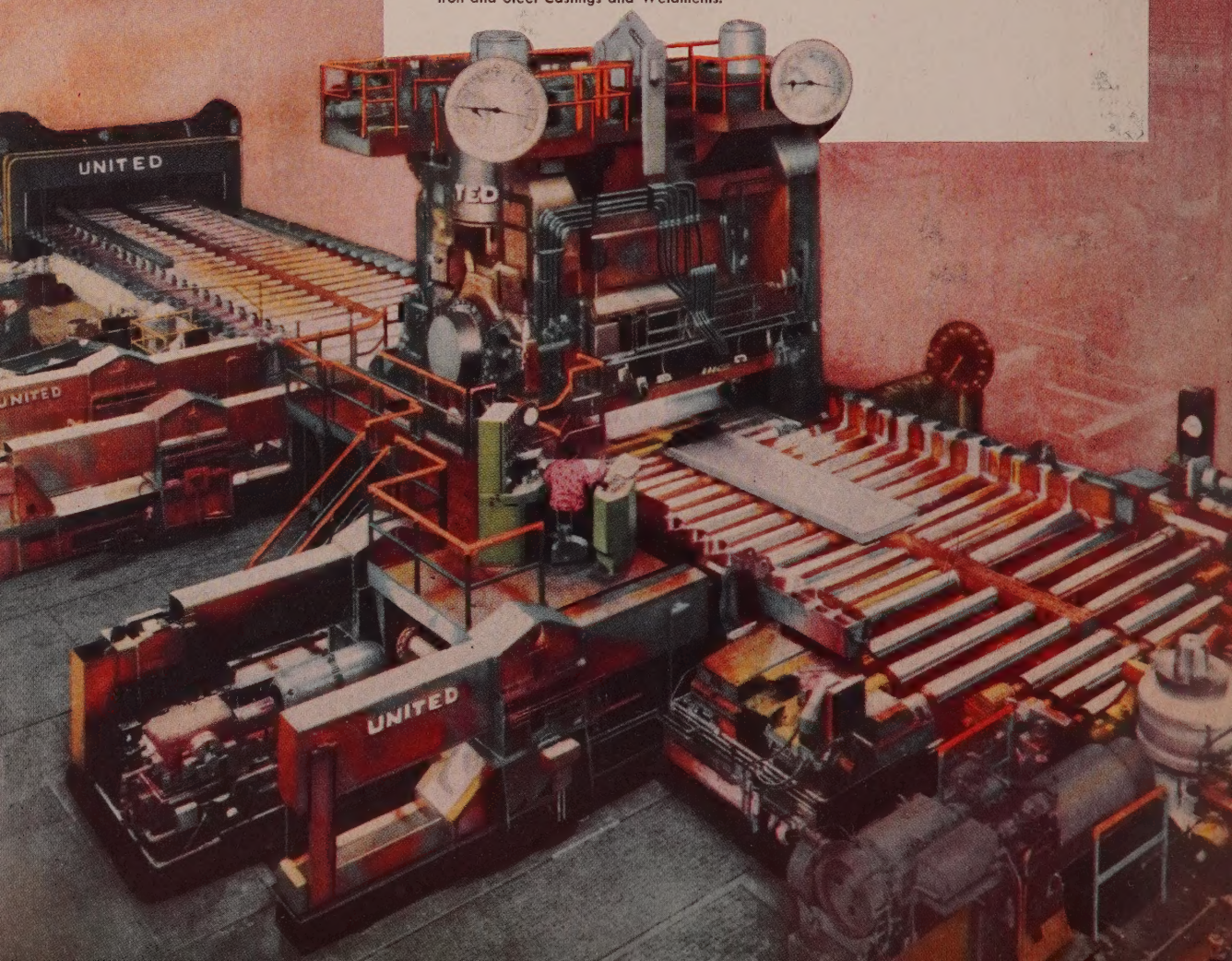
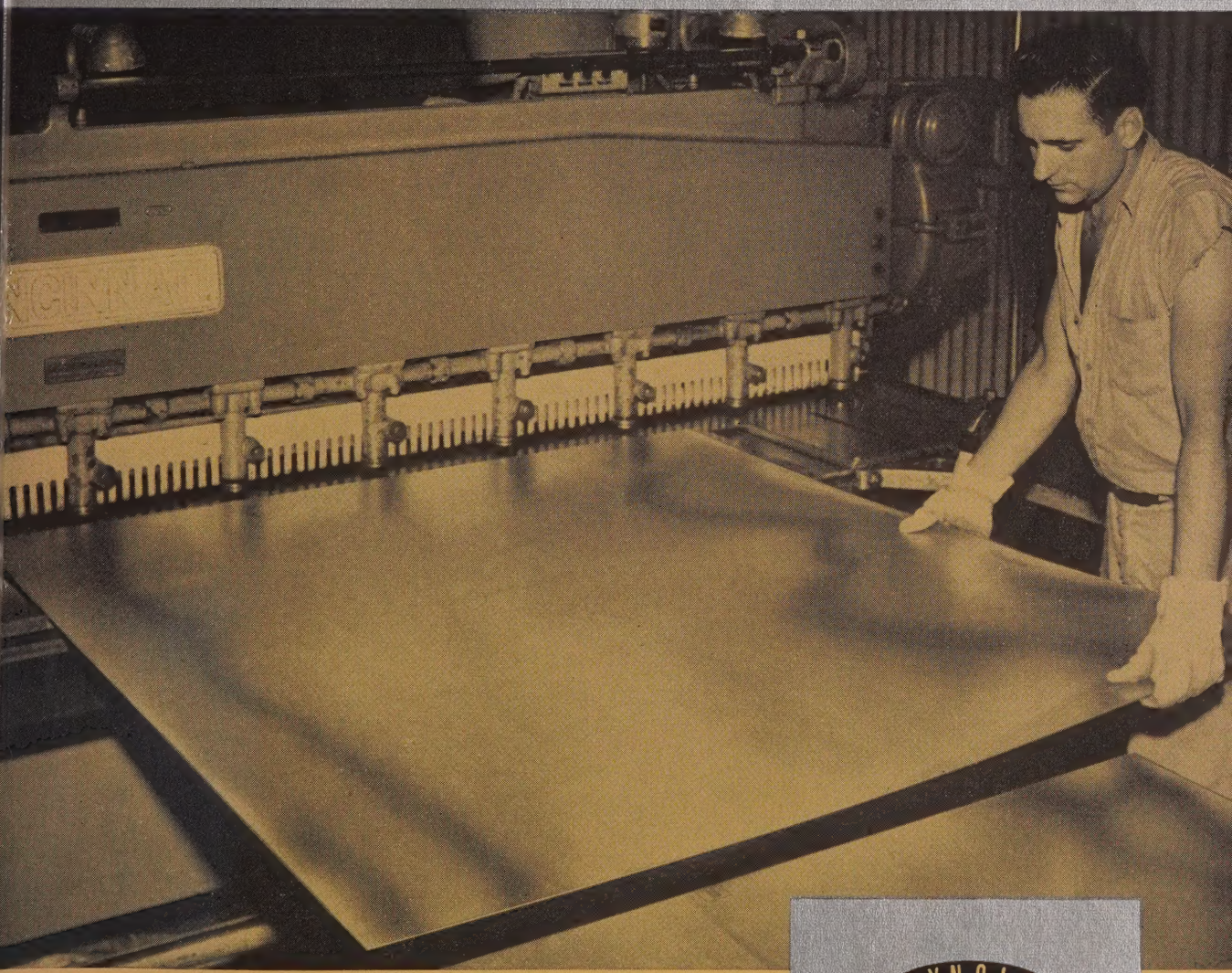


# aluminum to size

## ...in practically any aluminum mill product



## from the Reynolds Distributor

The type, size, alloy, and quantity of the aluminum mill products *you* need are in inventory at your nearby Reynolds Distributor. He saves you storage costs and warehouse space. And he offers *more* than aluminum alone. He can give you technical assistance, literature, and sound advice on using and working with aluminum. Often, he has the facilities to help you cut fabrication expense. He has aluminum that is quality-controlled (Reynolds Aluminum), and he can get it to you fast! *Reynolds Metals Company, P. O. Box 2346-DO, Richmond 18, Virginia.*

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"ADVENTURES IN PARADISE"—
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**For the name of the nearest Reynolds Distributor, look under "Aluminum" in your classified phone book**

# for fast delivery of the aluminum you need, as you need it, call your nearby

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Bralco Metals Inc., *Los Angeles
Metals Supply, *Emeryville
Perry Kilsby Div., Republic Supply Company of California (Tubing & Pipe) *Los Angeles, San Francisco, San Diego
Pioneer Aluminum Inc., *Los Angeles
Rebco, Inc., (Architectural) *Los Angeles
Republic Supply Co., *Los Angeles
Reynolds Aluminum Supply Co., Fresno, *Los Angeles, Sacramento, San Diego and San Francisco
Joseph T. Ryerson & Son, Inc., Los Angeles, San Francisco
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Silver Steel Co., *Denver
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Vincent Brass & Aluminum Co., *Minneapolis, St. Paul
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Mapes & Sprowl Steel Co., *Union
A. B. Murray Co., Inc., *Elizabeth (Tubing & Pipe)
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Passaic Metal Products, Inc., (Architectural) *Passaic
Rebco-Metro, Inc., West New York (Architectural)
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Silver Steel Co., Albuquerque
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Ontario Metal Supply, Inc. (Rod only) *Rochester
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Morgan Aluminum-Welding Rod Co., Mt. Carmel, Pa. (Welding Wire)
A. B. Murray Co., Inc., Bristol, McKeesport (Tubing & Pipe)
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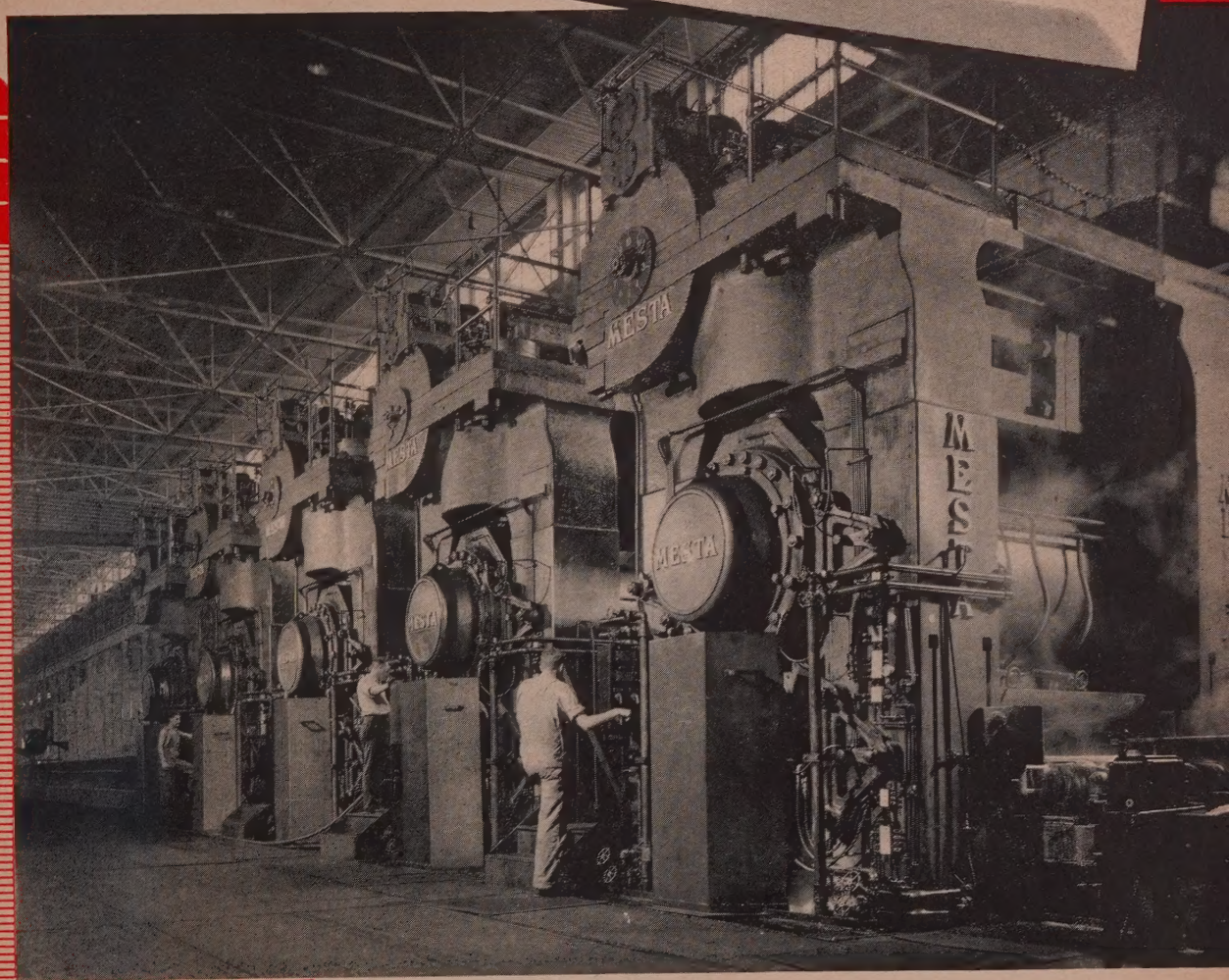


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**MODERN METALS**

Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

ON THE COVER: You don't have to dig the data out of that cover chart; the statistics are tabulated on page 78. Purpose of the chart is to show at a glance the soaring growth of the aluminum industry in the past 15 years and to show the relationship between total new supply (gray background) and shipments of aluminum products (colored bars) in each year since 1945. (We are indebted to the Aluminum and Magnesium Division of the U. S. Department of Commerce for much of this data.) Our own estimates for 1960 are also shown. We selected that particular 15-year period because this month marks the 15th anniversary of Modern Metals. Highlights of each of these frantic years are briefed in the review beginning on page 14.

•

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Modern Metals is published monthly by Modern Metals Publishing Co., not incorporated, at Barrington, Ill. Printed in U.S.A. Subscription in the United States: To fabricators and users of light metals—$3.00 one year; $5.00 two years; $6.00 three years. To all others in U.S.—$10.00 per year. Foreign $9.00 one year; $15.00 two years; $21.00 three years. Back issues: $1.00 each.

Modern Metals has by far the world's largest circulation among light metals fabricators, foundries and product manufacturers who use aluminum, magnesium, and titanium. Circulation: Now over 15,000 copies per month. Acceptance under controlled circulation at Barrington, Ill.

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# Modern Metals

**VOLUME XVI** **FEBRUARY, 1960** **NUMBER 1**

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Economical unit puts production welding of aluminum within reach of firms that can't afford heavy-duty machines.

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Primary output jumped 19% last year, and plans are underway to make Norway Europe's biggest producer.

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Such castings are produced by using the Wessel System of pouring aluminum, which calls for a closely controlled cycle.

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**UNIT DIES SPEED DIE CASTING** ..... J. H. Mills 60
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**RUGGED MAGNESIUM CASE** ..... R. E. Holmes 64
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Castings

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# Letters

## Aluminum Containers

Sirs:

Since we have some interest in the possibility of producing aluminum cans for frozen concentrated juices, I would appreciate having five reprints of the article concerning aluminum cans which appears in your January 1960 issue, beginning on page 88.

"J"—California

Sirs:

That January article on the Coors beer can development was very timely and well done. We were also very interested to see that a number of independent can manufacturers are planning to get in the business.

I would like about 25 reprints. . . .

"S"—New York

**MM—We have made reprints of the 10-page "Man-of-the-Year" feature that details the aluminum can-making operations at the Coors brewery in Golden, Colo. It also covers latest developments in aluminum cans for oil and citrus fruit.**

**Copies are available at a dollar apiece as long as they last.**

## Hydro-T-Metal

Sirs:

Recently I came across a short article on Hydro-T-Metal, a new alloy of titanium, copper and zinc, developed by Hydrometals, Inc., formerly known as Illinois Zinc Co.

I am very much interested in obtaining more information on this new material, and would greatly appreciate any data you can forward to me.

"K"—Florida

**MM—The source to contact is: Mr. William Lowe, Vice President, Hydrometals, Inc., 405 Lexington Ave., New York, N. Y.**

**This company has complete technical and commercial data on this new alloy.**

## Explosive Forming Aluminum

Sirs:

I am seeking information on explosive forming to simplify the manufacture of a large area complex sheet aluminum dish.

Can you furnish data on explosive forming? If not, can you recommend possible sources of information? Any general or detailed written article will be appreciated.

"F"—Texas

**MM—Lots of firms are experimenting with the process—and with fair success, we believe. But details so far are meager.**

**One such firm is Ryan Aeronautical, San Diego. As yet, we haven't published anything on the subject, but maybe you can get some information from Ryan.**

## Home Tapping Unit For Beer Barrels

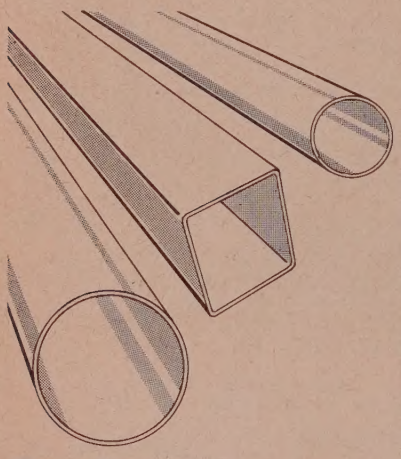
Sirs:

In your January 1960 issue you showed an aluminum beer barrel with a home tapping unit. We are wondering if all breweries are going to utilize this assembly, and if it is adaptable for the use of all brewing facilities.

Is this being distributed on a national basis, and, if so, could you please advise where it can be obtained. . . .

"G"—Michigan

**MM—This tapping system was developed by Benson Mfg. of Kansas City for use with their aluminum beer barrels. It holds 3.87**



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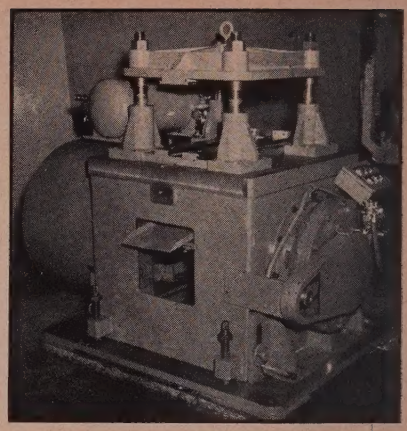

MRF Cut Off Press...

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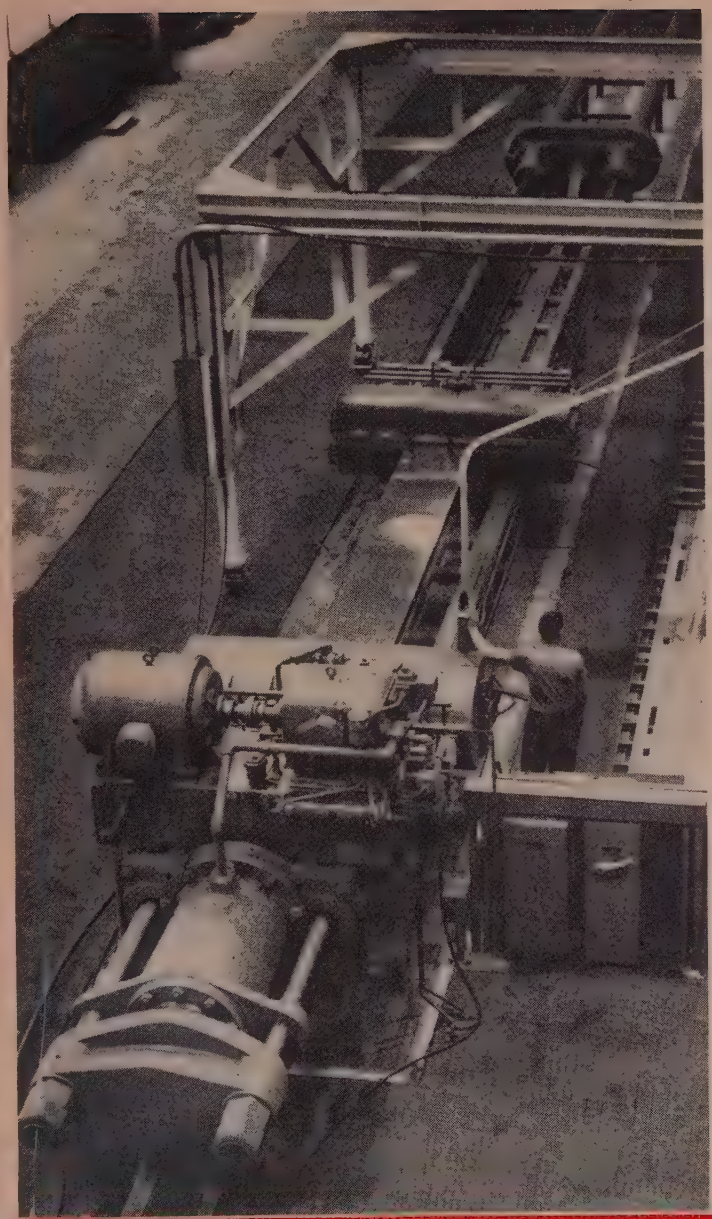

Photo courtesy of Anaconda Aluminum Company also shows Vacu-Lift equipment.

# Hyde Park

# STRETCHER LEVELLER

## at Anaconda Aluminum Company

TERRE HAUTE PLANT

This photograph shows 375 ton leveller designed for handling sheets up to 78 inches wide by 34 feet long.

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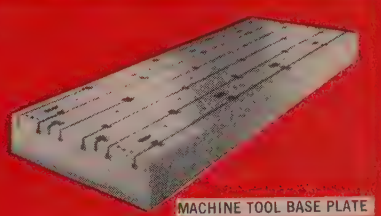


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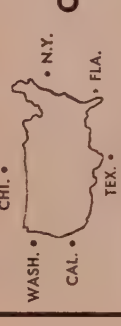


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WE BUY EXCESS STOCK


gallons, or 60 glasses of suds. Both the barrels and tap are distributed by Reynolds Metals Co., Richmond, Va.

As for whether other brewers can use it, we suggest you contact Benson Mfg. Co., 1811 Agnes, Kansas City, Mo.

### Bending Aluminum Tube

Sirs:

Would you please send me all the information you have available on the bending of aluminum tubing. I have reference to an article, "High Speed Bending of Aluminum Tubes and Shapes," by W. A. Osterland which you published.

"H"—Ohio

**MM—You might try Pines Engineering Co., 601 Walnut St., Aurora, Ill., and Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.**

### Chlorine Fluxing

Sirs:

We are interested in obtaining copies of an article which appeared in your June 1958 issue. The article is titled, "In Process Chlorine Fluxing Improves Billet Properties."

We would appreciate two reprints, or two photostats. . . .

"W"—Pennsylvania

**MM—We found a set of tear sheets, and they've been sent.**

### Those Aluminum Christmas Trees

Sirs:

We are interested in developing an important project in aluminum Christmas trees for next winter.

Your courtesy in advising us if you can supply aluminum Christmas trees already manufactured would be appreciated.

In the event you can't, we would appreciate your viewpoint on how we can go about manufacturing them ourselves in San Francisco.

"C"—California

**MM—We never got around to making any ourselves—but if business doesn't get better, we may be around for an order soon.**

**Maybe some aggressive reader who makes Christmas trees can fill "C's" order—and thereby keep him out of the business of competing next year. We'll gladly forward any inquiries to "C."**

### Castings For Power Lines

Sirs:

We note in your recent "Letters" column that "C" of Michigan wishes to secure castings to be used in the suspension of high-voltage electric power lines. Since our company manufactures hardware for the power line industry, we feel this item may be incorporated into our present line of products.

We request that you make it possible for us to contact "C" of Michigan so that we may further explore his invention and its possible incorporation into our line.

"J"—Ohio

**MM—We have sent your request to "C" of Michigan; hope you can help develop his product.**


# METALLURGIST Wanted

Progressive nationwide metal fabricating concern has an excellent opening for an experienced metallurgist at one of their eastern divisions.

Non-ferrous background preferred but not absolutely essential. Should have some experience in metal production processes and mill problems. Salary open.

Please send complete resume to

**Box No. 1277**

**MODERN METALS**
435 N. Michigan Ave.,
Chicago 11, Ill.



## PRODUCT DESIGN ENGINEER WANTED

A growing progressive company is looking for a product design engineer with practical experience in the aluminum building products field, especially prime slider windows. Must be able to quote "follow through" from actual die design to finished product.

If you have these qualifications, send a complete resume and salary requirements to personnel manager, Weather-Tite Company, P. O. Box 310, Bedford, Ohio.

All replies strictly confidential



## SALESMAN
**for**
**Progressive Organization**
**Delaware Valley Area**

Prime producer aluminum extrusions. Experience preferred. Would consider man with good sales background.

Send complete resume to Box 222,

Modern, Metals, 435 N. Michigan Ave., Chicago 11, Ill.

# FOR TOP OF THE LINE MODELS

# Magic Chef®

## TURNS TO G.E.I.

Instrument panels of 1960 model Magic Chef ranges are framed in the magic metal—aluminum . . . extruded, fabricated and anodized by General Extrusions, Inc. The extruded aluminum sections not only add beauty to Magic Chef's leading line of 1960 ranges but utility as well. The highly anodized finishes—some of which are gold anodized and black painted while others are bright-dipped and clear anodized—resist stains from splashing grease and other foodstuffs and are not affected by detergents when washed. Another extrusion, not shown up front, is used as a mounting bracket for the instrument panel. This is yet another example of a manufacturer turning to extruded aluminum to meet better such requirements as durability, beauty and economy. It is another example of a leading manufacturer turning to G.E.I. for uniform quality and unfailing delivery. G.E.I. also specializes in producing aluminum extrusions that pioneer a new application. Discuss your extruded aluminum needs—one part or a million—with G.E.I.

**GENERAL EXTRUSIONS, INC.**
**4040 LAKE PARK ROAD • YOUNGSTOWN, OHIO**
Sales Offices at St. Louis, Pittsburgh, Chattanooga, and Cleveland
*Consult your classified phone book under Aluminum Products*

HARVEY Aluminum

PRIMARY ALUMINUM

pig • ingot

EXTRUSION AND SHEET billet

FOR ALL PURPOSES

It pays to buy a good share of your requirements from an American independent producer. Contact the nearest sales office or general offices in Torrance, California.

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1430 West Peachtree Street, N.W.
Atlanta, Georgia—TRinity 5-8376

**CHICAGO**
6429 West North Avenue
Oak Park, Illinois—EUclid 3-6320

**DALLAS**
5044 North Westmoreland Road
Dallas, Texas—FLeetwood 7-4327

**DETROIT**
16244 James Couzens Highway
Detroit, Michigan—UNiversity 4-1030

**HARTFORD**
530 Silas Deane Highway
Hartford, Conn.—JAckson 9-5120

**LOS ANGELES**
19200 South Western Avenue
Torrance, California—SPruce 5-2181

**PHILADELPHIA**
132 Allendale Road
King of Prussia, Pennsylvania
CHestnut Hill 7-7423

**ST. LOUIS**
2 South Brentwood Boulevard
St. Louis, Missouri—VOlunteer 3-3445

**SAN DIEGO**
426 Olive Street
San Diego, California—CYpress 6-6101

**SAN FRANCISCO**
2015 Center Street
Berkeley, California—THornwall 5-3133

**SEATTLE**
550 Mercer Street
Seattle, Washington—ATwater 3-4990

**WASHINGTON, D.C.**
1001 Connecticut Avenue, N.W.
Washington, D.C.—REpublic 7-4366

*A major independent producer of quality aluminum in all alloys and sizes: Pig, ingot, billet, rod and bar, pipe, tube, hollow sections, press forgings, forging stock, hand forgings, impact extrusions, electrical bus bar, structurals, special shapes, light and heavy press extrusions, screw machine and other aluminum products. Similar products in titanium, zirconium, steel.*

HARVEY Aluminum

# Fifteen Frantic Years

(see cover and page 78)

1945: ". . . We shall try to stimulate thought and promote new uses for light metals . . . The speed with which they will advance and the volume of applications will be determined by . . . free exchange of information . . ." Those famous last words appeared on our front cover, February 1945—our first issue. It was mailed to about 5000 fabricators and manufacturers, and about 1000 subscribed. That was our downfall; we couldn't quit. The first issue also noted that primary aluminum was offered at 15c a lb. with damned few takers. The Senate held hearings on aluminum and asked industry men what should be done with war-built light metals plants that cost over $1 billion. Nearly everybody at the hearings said they'd be glad to take them off Uncle Sam's hands—but not for money. There was 1.5 million tons of aluminum scrap hanging over the market. At year's end, Modern Metals was broke.

1946: We put some new magnesium binoculars on the January cover—to see things a little clearer, apparently. The government wanted to get rid of its magnesium plants. Nobody wanted them. Reynolds bought a few aluminum plants and planned an aluminum-concrete house. They didn't, but started selling lots of roofing sheet. Harvey Aluminum bought a big extrusion plant from the government. Alcoa started its first $100 million expansion program. You could buy aluminum sheet for about 25 cents a pound; pure magnesium for 20 cents a pound. Henry Kaiser needed metal for the cars he was going to make, leased a bunch of government plants and jumped into aluminum. Aluminium Limited cut the price in Canada to 13.25 cents per pound, wasn't interested in absorbing the three-cent tariff to sell in the U. S. A. Modern Metals compiled its first survey; started the "New Enterprise" column; and published its first Light Metals Buyers directory for our 18 fearless advertisers. But it didn't help; we went further in the red than the first year.

1947: Dozens of outfits started making aluminum pressure cookers—and badly. One outfit was producing 4000 aluminum windows daily; promptly went broke. We published "Titanium—A New Industrial Metal?" We're still asking the question. Aluminum utility sheet came on the market at 22 cents a pound. Zinc die castings being nosed out by aluminum. The aluminum awning business got underway; was a profitable and "nice" business for the few in it. Magnesium luggage first appeared. Both it and its maker flopped. A second magnesium sheet mill started. Ford ran out of steel; started using aluminum running boards. We put the then-famous Tucker car on our August cover; bragged that it would use 200,000 tons of aluminum a year; were nearly run out of town when the $20 million promotion later flopped. Tariff on aluminum was cut by a third, and Aluminium Limited started selling to U. S. We predicted an aluminum shortage. It came five months later. We called light metals a $1 billion industry. Our circulation went up to 8300 a month, but we couldn't get out of the red.

1948: This was the year the sharp dealers got rich selling surplus aluminum. Demand was terrific, and they were buying and selling out of any phone booth. For the first time, over a million tons of aluminum was consumed in one year. Droughts held back even higher output and use. Scrap cost more than primary metal. But the casting business dragged, and lots of foundries folded. The utensil market got tough, and some in this game quit. Alcoa decided to build the first gas-burning smelter; Reynolds Wrap got into the big time; and Kaiser made 16% on sales of $75 million. Aluminum grain silos were introduced; helped acquaint the farmer with aluminum. Magnesium castings were mass-used in chain saws; helped teach portable tool makers that light weight pays off. Light metals' users numbered over 15,000, and we screamed that more Canadian aluminum was needed to keep them supplied. Modern Metals was still very broke.

1949: The great postwar boom started fading. By the second quarter, sales of most products had slipped 20 to 30%. The metal business skidded 45%. At least 400 light metals firms folded, but magnesium sales went up. Titanium output hit 75,000 pounds, and everybody said the sky was the limit. They were right; only aircraft firms could afford the stuff. Somebody built an aluminum cab starter's booth. It didn't amount to much, but the telephone

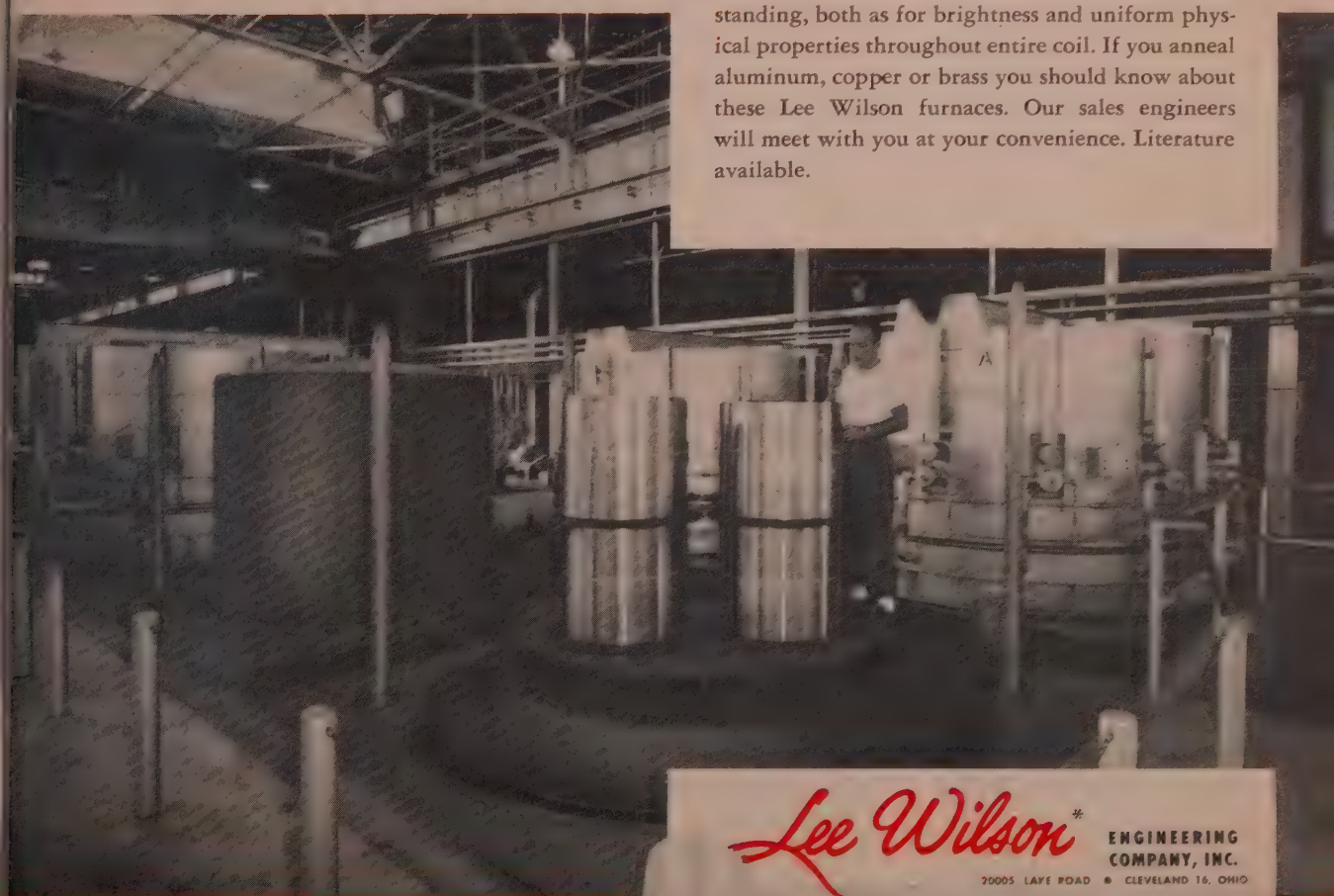
Coils show no edge damage even when stacked three high.

An up-to-the-minute report on the

# Bright Annealing of thin gauge Aluminum Coils

Engineers at the Scovill Manufacturing Company, Waterbury, Conn., have definitely proved that thin gauge aluminum coils can be bright annealed while standing on edge without edge damage. This means that aluminum producers and converters now have greater control of annealing and greater production flexibility than ever before, because they will now be able to utilize the high-convection, bell-type furnace designed and perfected by Lee Wilson.

Scovill engineers successfully annealed large coils of .025 gauge under standard annealing practice. Lighter gauges were annealed by placing aluminum discs between coils. Annealing results were outstanding, both as for brightness and uniform physical properties throughout entire coil. If you anneal aluminum, copper or brass you should know about these Lee Wilson furnaces. Our sales engineers will meet with you at your convenience. Literature available.



Three Lee Wilson high-convection furnaces designed to anneal 3,500 pounds of aluminum coils per hour for each furnace.

Lee Wilson* ENGINEERING COMPANY, INC.

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Your guarantee of consistent high quality in aluminum extrusions . . . plus complete fabricating and finishing by industry experts.

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**WE CAN'T DO MORE—
BUT WE DO IT BETTER.**

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MAGNOLIA, ARKANSAS**

company saw it and began putting up aluminum phone booths everywhere. Aluminium Limited started building its huge Kitimat aluminum smelter. Alcoa planned a smelter in Alaska; later shelved it (one of its smartest moves) but proceeded to build a gas-powered plant in Texas. It wasn't a good year for aluminum. Modern Metals' profit: $546.25.

●

1950: Korea became a household word. The stock market smelled trouble; started booming. Aluminum users feared shortages and started buying. Production got off to a helluva fast start. Extrusion industry grew so fast that press manufacturers couldn't keep up with demand. Increased military demand boosted magnesium sales 35%. Aircraft firms wanted so much titanium that demand was running ten times over supply. Dow decided to build a big-time rolling mill for magnesium despite light demand for sheet. The company also started selling mill products through an established distributor in California. The first all-aluminum bridge was built in Canada. Big aluminum cargo containers were produced for shipping firms. Alcoa planned the world's first aluminum skyscraper — a 31-story office building which led the way to big uses for aluminum in building. Modern Metals made two grand; bought chairs for everyone.

●

1951: Continuous casting of aluminum got important as the Hunter and Properzi processes showed cost-cutting possibilities. Seventy-five aluminum distributors formed an association. The fabulous Celler aluminum hearings revealed that six groups wanted Uncle Sam to help them get into the aluminum business. Only Harvey made it; later sold out to Anaconda. Forty-one extruders including Kaiser and Bridgeport Brass were beginning to battle for business. Aluminum was on allocation, but it was a prosperous year for those who had enough metal piled in their cellars. Aluminum producers started a 187,000-ton expansion program with government help. The Korean war prodded the government to boost magnesium production by 200%. It also wanted titanium producers to increase output thirty-three-fold. The S. S. United States, biggest U. S. liner, used lots of aluminum. Auto makers decided aluminum was here to stay; began redesigning for it; used about 40,000 tons that year. Modern Metals' circulation hit 10,000. We bought turkeys for Christmas.

●

1952: This was aluminum's biggest year (1.3 million tons shipped), despite severe drought, and the metal was allocated all year. Copper was even scarcer. General Electric started switching to aluminum in a big way. Copper fellows got mad at us when we showed why this was an irreversible trend. Revere saw it coming; actually became the largest independent wrought aluminum fabricator. Other copper outfits soon got into the act. We reported what Europe was doing with aluminum containers; said the big day would be here sooner than some thought. Sheet producers started expanding or building new mills. Furniture makers wanted to use more aluminum, but the government told them to lay off. Steel and wood window outfits started switching to aluminum. We noted that National Homes sold 10,000 prefabs that year; made the silly suggestion that prefabs "are a good market for a lot of aluminum products." Modern Metals grabbed more customers than ever; had the walls painted that year.

●

1953: The first hot metal deal between G. M. and Reynolds got underway at Jones Mills, Ark. Chrysler and Kaiser were going to do the same thing in Louisiana, but didn't. Olin started making like it wanted to be an aluminum producer. Harvey said it would build an aluminum rolling mill out west, but didn't. Magnesium demand hit the skids, plants were shut down, but the price went up 2.5 cents a pound. High-purity aluminum sheet was being imported for jewelry, etc. Crane Co. spent $25 million to build a titanium sponge plant; soon wished it hadn't. Disposable aluminum foil plates and containers started booming as aluminum became more available. The 72nd extruder entered the business. Third round of government sponsored aluminum expansion faded, and the Air Force cancelled one-third of its heavy press program. Price of aluminum ingot was upped one cent to 21.5 cents a pound. Kaiser and Alcoa made deals to buy 786,000 tons of aluminum from Canada over a five-year period; found it tough to swallow during the 1958 slump. By year's end, aluminum supply was up to here — even though our survey showed that 21,000 firms were now using the stuff. Modern Metals was getting back those early years' losses.

●

1954: Kennecott got into aluminum via the back door by buying 13%

# *Dependable* ***Background*** *... for Better Extrusion Dies*

Extending the range and application of light alloy extrusions is one of the important services PMD has contributed to the light metals industry. Through the development of advanced tooling techniques, PMD has helped pioneer imaginative new concepts of product design—concepts which point the way to new cost savings by reducing or eliminating such production operations as assembling, fastening, joining, etc.

PMD's background of experience in designing and building extrusion dies is your assurance of improved product quality, increased output and lower costs. You can depend on PMD extrusion dies for maximum die life, minimum starting problems and consistent accuracy.

NEW! For extruding the space age metals — titanium and A286 stainless steel — as well as copper base alloys and steel alloys, PMD is now supplying precision cast dies in chromium and tungsten hot-work steels, tungsten and molybdenum high-speed steels, and cobalt alloys.

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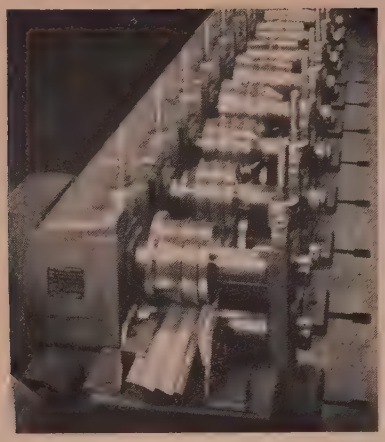

## Yoder Roll-Forming Equipment mass-produces shapes accurately, economically

Yoder Roll-Forming Equipment, even with part-time operation, can effect significant savings in many metal working applications and industries. Shapes, simple or complex, can be quickly and economically produced the Yoder way from a wide variety of flat-rolled coated or uncoated stock ... in thickness up to ¾ inch ... in speeds up to 50,000 feet per day.

Yoder engineers flexibility and precision into metal forming operations. For example: many basic shape modifications, such as coiling, welding, notching, ring-forming, perforating, and cutting to length can be simultaneously accomplished with little or no additional labor cost.

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This fully-illustrated 88-page book clearly discusses every important aspect of Yoder Roll-Forming Equipment and methods ... it's yours for the asking!

**THE YODER COMPANY**
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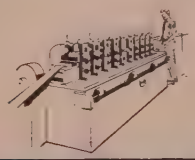


YODER COLD ROLL FORMING MACHINES

of Kaiser Aluminum's stock for about $20 million; made a bundle. Kennecott pushed its foot in the titanium door; got stomped on. Pacific Northwest people grumbled that the aluminum industry was wrecking the economy up there by using all the government power. Their song has changed. Three firms shelled out $55 million to get into the titanium sponge business. As the metal slump deepened, aluminum producers laid off 3000. The fast-growing extrusion industry got caught, and the first price war broke out. But before the year ended, demand stiffened and so did prices. Shwayder started redesigning magnesium into its Samsonite luggage. The big can companies admitted they were looking seriously at aluminum oil cans. Beer cans were being tested. A 22-story New York building was clad in an aluminum curtain wall in 10 hours. Price of aluminum went up 0.7c a pound. Smelters were losing money; some quit. Kaiser decided to build a $230 million aluminum complex at Ravenswood. Hardware manufacturers were switching to aluminum. Demand for aluminum in building looked terrific. Everybody at Modern Metals got two turkeys.

●

**1955:** The price of aluminum pig advanced a cent in January. Aluminum demand was terrific throughout the world so hiking the price was easy. Revere bought a company to get into the foil business. Anaconda, completing its $80 million reduction plant, decided to build a $25 million fabricating plant in Terre Haute for casting, extruding and rolling. Completed last year, plant is only in partial operation. Copper outfits quit competing with aluminum; raised their price out of reach. Pre-colored coil was finding new markets. The highway program began taking big quantities of aluminum signs, bridge railings and light standards. Cars sold so well that aluminum die casting sales boomed to over 200,000 tons. Aluminum was the star of the Boat Show, but plastics were already threatening. At the Home Improvement Show, over half the products were aluminum (plenty of them were junk). Magnesium price jumped 1-½ cents. Titanium dropped 50 cents a pound as a surplus developed. Over 100 extruders were selling their products to 9400 consumers. The aluminum shortage brought on more Congressional hearings. Harvey Aluminum got a government okay and help to build a $65 million aluminum smelter. Reynolds bought a sheet and foil mill in Canada. British Aluminium planned a $130 million smelter in Canada. Alcoa and Ekco joined forces to develop the sizzling foil container market. Modern Metals' profit sharing program was well received that Christmas.

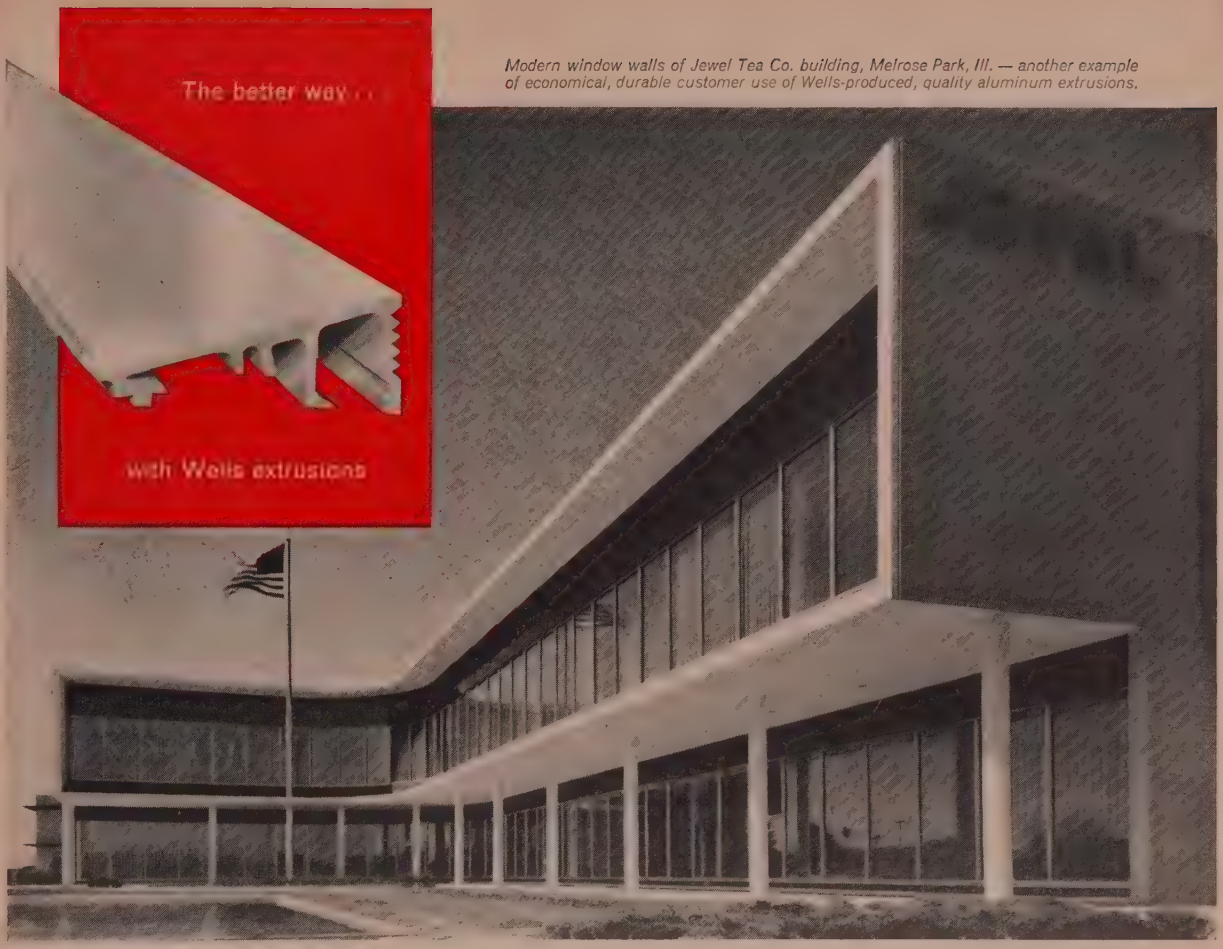
●

**1956:** Chrysler was leading the pack in switching to aluminum. Revere came out with its tube-in-strip. Olin decided to go for a $231 million aluminum operation; was later joined by Revere. Copper was selling at twice the price of aluminum. Auto makers used 120,000 tons of aluminum. Price of aluminum ingot went up 1.5 cents a pound. (Within a decade it had soared 71%.) Water heater makers started switching to aluminum. Magnesium tooling plate started catching on. Cerro de Pasco bought Fairmont Aluminum. Alcoa decided on coal for power at its newest $80 million smelter in Warrick, Ind. Price of magnesium went up 1.25c a lb. About 800 firms were selling over $200 million of aluminum windows and doors. Doehler-Jarvis developed a six-cylinder die cast engine block; car manufacturers got the idea; but Doehler-Jarvis didn't benefit. Alcoa Wrap was introduced. Republic Steel foolishly bought a half interest in Crane Company's titanium venture which folded. Demand for home swimming pools opened up a new market for aluminum. A second magnesium producer planned to build a plant in Alabama; poured its first metal last year. Aluminum ingot went up another 1.2c a lb. A Senate committee took another shot at aluminum producers. Missed again. Aluminum capacity now exceeded demand. Federated Metals started building the world's largest secondary smelter. Price-cutting extruders acted as though they wanted to go bankrupt. Modern Metals' circulation went up to 13,000. Helluva year.

●

**1957:** Aluminum producers got serious about the building market; started to show architects how to use the stuff. Ninety distributors were selling 17% of all aluminum wrought products; had 1900 salesmen out beating the bushes. Kaiser bought U. S. Rubber's wire and cable business. Aluminum demand softened due to building slump. The titanium industry said it was ready for the big push. Biggest aluminum door company made a million of them in its first four years. They've been in financial trouble ever since. Another drought hit the aluminum industry. Canadian freight cars made of aluminum increased payloads tremendously. Reynolds signed its second hot

(Continued on page 22)




*Modern window walls of Jewel Tea Co. building, Melrose Park, Ill. — another example of economical, durable customer use of Wells-produced, quality aluminum extrusions.*

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# 101 aluminum fabricators have ...Amchem's newest

## ALODINE 1200S protects aluminum best ...at less cost, in less time!

To the hundreds of long-time users of Amchem Alodine—the first, low cost effective surface conversion treatment for aluminum—add a new host of fabricators who are employing the newest Alodine development—ALODINE 1200S!

If you are producing aluminum—any type of aluminum—you'll want to investigate the production advantages and profit potentialities of this new Alodine pre-paint process that provides constant, uniform quality as well as big savings in time, equipment and processing costs!

Through increased chemical activity ALODINE 1200S slashes processing time *up to 50 percent!* A 1200S system can be installed on your production line quickly and conveniently . . . and bath is maintained chemically . . . no special equipment required to control contamination! In an ALODINE 1200S system, products can be processed through continuous dip in the same time cycle other conversion coatings require for continuous spray lines! That means lower initial equipment and maintenance costs, wider range of product applications regardless of the application method—brush, dip, continuous strip or spray. ALODINE 1200S is qualified under Government Specification MIL-C-5541.

ALODINE 1200S is Amchem's positive answer to constant uniform quality in aluminum processing. Put its assured protection and production flexibility to work for your aluminum products and market them with greater confidence!

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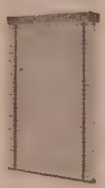
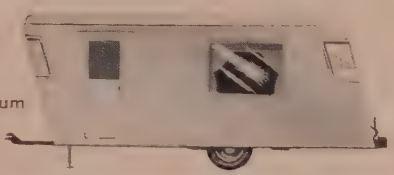
aluminum stop signs

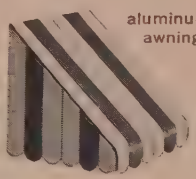
aluminum doors


aluminum venetian blinds

**IN CORROSION RESISTANCE AND PAINT BONDING QUALITIES TO THESE AND**

aluminum cameras


aluminum house trailers


aluminum awnings

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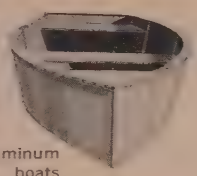
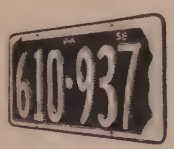
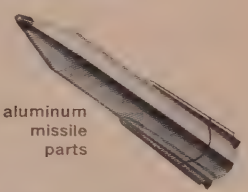

aluminum boats



aluminum license plates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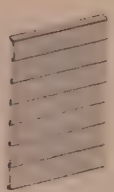
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This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

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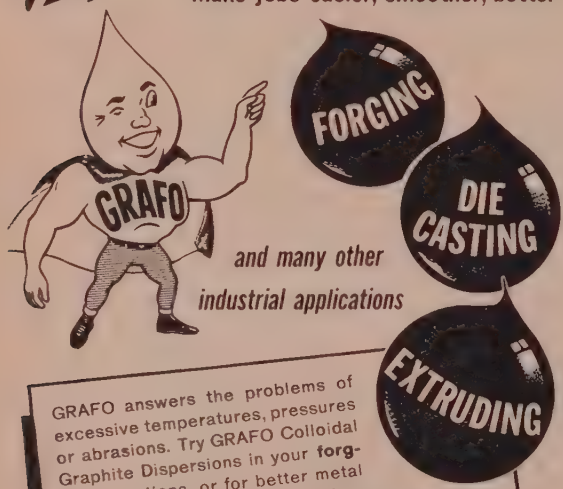


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metal contract with G. M. — to supply aluminum for engine castings at Massena. Aluminium Limited showed how aluminum can manufacturers were profiting in Europe. Olin bought Southern Electric Corp., aluminum wire and cable manufacturer. Anaconda shut down 25% of its primary aluminum capacity. Price of titanium was cut 20% as demand weakened. As aluminum demand slipped, producers got austerity-minded; clipped TV show costs; but raised ingot prices one cent. A bloody war developed in the window and door business, and the extrusion industry was sick. Esso bought aluminum cans for oil; Kraft bought them for cheese. Reynolds bought into Tube Investments in England. Modern Metals' survey dug up 25,000 plants using light metals. Anaconda bought Cochran Foil. Dow bought a magnesium plant from the government. Modern Metals' biggest year.

●

**1958:** Outboard Marine used 20,000 tons of aluminum die castings for outboard motors. Aluminum got down to "resourceful selling," and extrusion billet prices were cut 1.9c a lb. Sheet was selling in volume at 5c under the market. We got hell for mentioning it. Aluminum furniture improved; used 20,000 tons of metal. Canadian British Aluminium poured its first metal in Canada; wondered what to do with it. Auto makers used 52 pounds of aluminum per car in a bad year. Schools and highways were using more aluminum, but the building industry went sour. As magnesium business softened and titanium producers' orders for it dried up, production was cut sharply. Once-prosperous aluminum window and door outfits were looking for mergers. Aircraft business was drying up. Missiles and rockets became important. Aluminium Limited cut its world price 2c a pound; U. S. producers followed suit. It didn't increase demand. The price was upped 0.7c later. Producers cut production 20%; claimed Russians were dumping aluminum, but nobody found any here. National Homes' aluminum prefab was the year's biggest development. Harvey started its aluminum smelter. Aluminum demand turned up in September. Ford and Reynolds made a 10-year hot metal deal. Reynolds picked off British Aluminium. Modern Metals' volume fell 30%.

●

**1959:** January saw plenty of businesses ready to open up and buy. Textron dumped its extrusion operation to Olin. Aluminum furniture makers saw strong spring ordering. Nearly everyone was getting into the pre-colored coil business as demand jumped. Coors brewery came up with a low-cost aluminum beer can. Oil cans were in volume production. Yttrium was being produced. Kaiser started selling aluminum conduit at $2 per foot. Others followed. Primary production was stepped up to 90% of capacity as hedge-buying against possible strike started. Alcoa bought into Furakawa Electric in Japan; joined with Italy's Montecatini to fabricate in Venezuela; and joined England's Imperial Chemical Industries in a big aluminum fabricating venture. Reynolds planned to build in Venezuela. Russia reported an aluminum shortage. Big aluminum order went for railroad cars. Dow broadened fabrication to include aluminum, other metals. Titanium producers kept lowering prices as markets kept shrinking. World magnesium prices weakened. Bridgeport Brass started building an $18 million rolling mill. Alcoa started selling building sheet 5c under regular sheet prices. By fall the prolonged steel strike slowed aluminum sales. Over 500,000 tons of aluminum were consumed by 7000 building product firms. Producers moved in closer to the home building business. Aluminum pig price went up 1.3c; soft alloy billet, 0.8c; wrought products about 5%, just before new union pacts were settled. A good year. Modern Metals circulation up to 15,000; outlook fuzzy.

●

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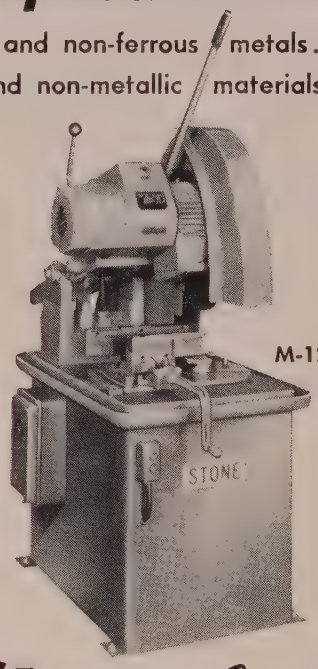


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# New Enterprise

Payloads increased by more than 1000 pounds are achieved with a newly developed **aluminum brick and concrete block handling unit.** It was developed and is manufactured by Schmidgall Mfg. Co., 307 Cass St., Peoria, Ill. The unit can be used either on a lift truck or separately suspended from a crane. The necessity for pallets is eliminated by a hydraulic gripping device which holds the first tier securely, this forming a platform for subsequent tiers. The A-frame consists of two extruded channels of aluminum alloy 6061-T6. Other structural members are of aluminum plate and heavy gauge sheet of weldable alloy 5083. More than 800 pounds was saved by aluminum construction, which made the increased payload possible.

C. M. Flynn Mfg. Co., 2605 Michigan, Detroit, has added **colored aluminum storm windows and** doors to the already vast array of conventionally finished products on the market. The new models are designed to harmonize with practically any exterior decorating scheme. "Now the home owner can select windows and doors which combine the maintenance-free features of aluminum and the decorating possibilities of baked enamel finishes," says C. M. Flynn, president. The durable, electrostatic baked enamel finishes come in white, pink, black, green, brown, copper and beige.

Two new warehouse bays — one in Los Angeles, another in Oakland — are being erected by the Earle M. Jorgensen Co. The new buildings will be primarily for storage and processing of steel plates. In addition to this, the company carries a complete line of **aluminum plates,** as well as bars, sheets, structurals and tubing in both steel and aluminum.

**Aluminum "space fences"** are on the alert across the country, ready to detect any enemy "peeping toms." The radar-like electronic screens can spot any object 1000 miles in the air. They are built for the government by Technical Appliance Corp., Sherburne, N. Y. Antennas and structural support members are of aluminum alloy 6061-T6. Its corrosion resistance is necessary since fences operate in all kinds of weather, and must be relatively maintenance-free to assure dependable signal transmission and reception. Ease of handling is important because installation usually takes place far from a good labor supply. Several hundred thousand pounds of aluminum sheet, rod and extrusions are being poured into space fence sites.

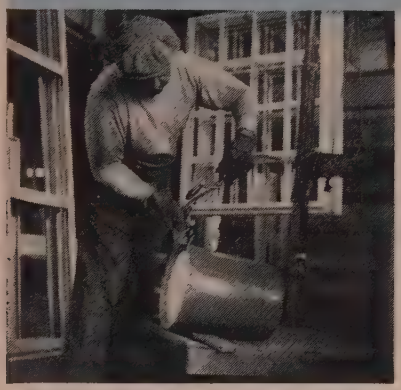
Florida Industries Inc. recently opened a new plant in Tampa. According to President Dan Rachelson, this is only the first stage of a long expansion program. The firm's newest product is the all **aluminum pre-engineered "Vacottage,"** and it is said to be setting sales records already.

The **coaxial cable** in Douglas Aircraft's new DC-8 jet airliner has a tubular copper inner conductor, foamed polyethylene dielectric, and commercially pure

**ZIP!** Off comes the can, for fast addition of the 90-lb. block of Pennsalt AE-16 S to the immersion tank.

**GRIP!** Easy handling Pennsalt AE-16 S eliminates the dust and danger of other etchants.

**DIP!** In the tank, AE-16 S melts without heat of solution to promote a uniform, satin-smooth etch.



# New solid etchant for aluminum

***non-scaling, dustless, easy to handle***

Here's a brand new way to prepare etching solutions for putting a uniform satin finish on any aluminum alloy. It's Pennsalt's new AE-16 S aluminum etchant . . . economically priced, and in *solid* form for easier handling and better performance.

AE-16 S is supplied in 90-pound blocks, packed in light metal containers that open readily with hand tools. Add AE-16 S to your immersion tank, and it melts with minimum agitation, providing a uniform concentration of alkali.

And, there's no dust, no heat of solution to upset tank temperature balance —no splatter from additions—none of the drawbacks of flake etchants. You get a clean, even etching job with AE-16 S, with uniform hide. Afterwards, tank cleaning is easier, because AE-16 S leaves no scale or sludge. Pennsalt's AE-16 S has been field-tested by leading aluminum fabricators and producers.

New AE-16 S is one result of Pennsalt's long experience and basic position in alkalis. This same experience is applied in Pennsalt service, to help you get best possible use of your metal processing materials and equipment. Write Dept. 234 or call for complete facts and figures.

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aluminum outer conductor. Produced by Phelps Dodge Copper Products Corp., New York, the radiation-free Foamflex cable connects the navigation and communication antenna circuits of the jet. The cable can operate in both pressurized and non-pressurized parts of the plane, and is said to have good frequency response over wide temperature variations.

Portable **aluminum bleachers,** with 22 to 24-inch centers and an 8-inch rise, have been developed by Berlin Seating Engineers, Berlin, Wis. Foot and seatboards are of extruded aluminum, with seatboards having an anodized, architectural finish and non-skid surface. Bleachers weigh an average of nine pounds per seat.

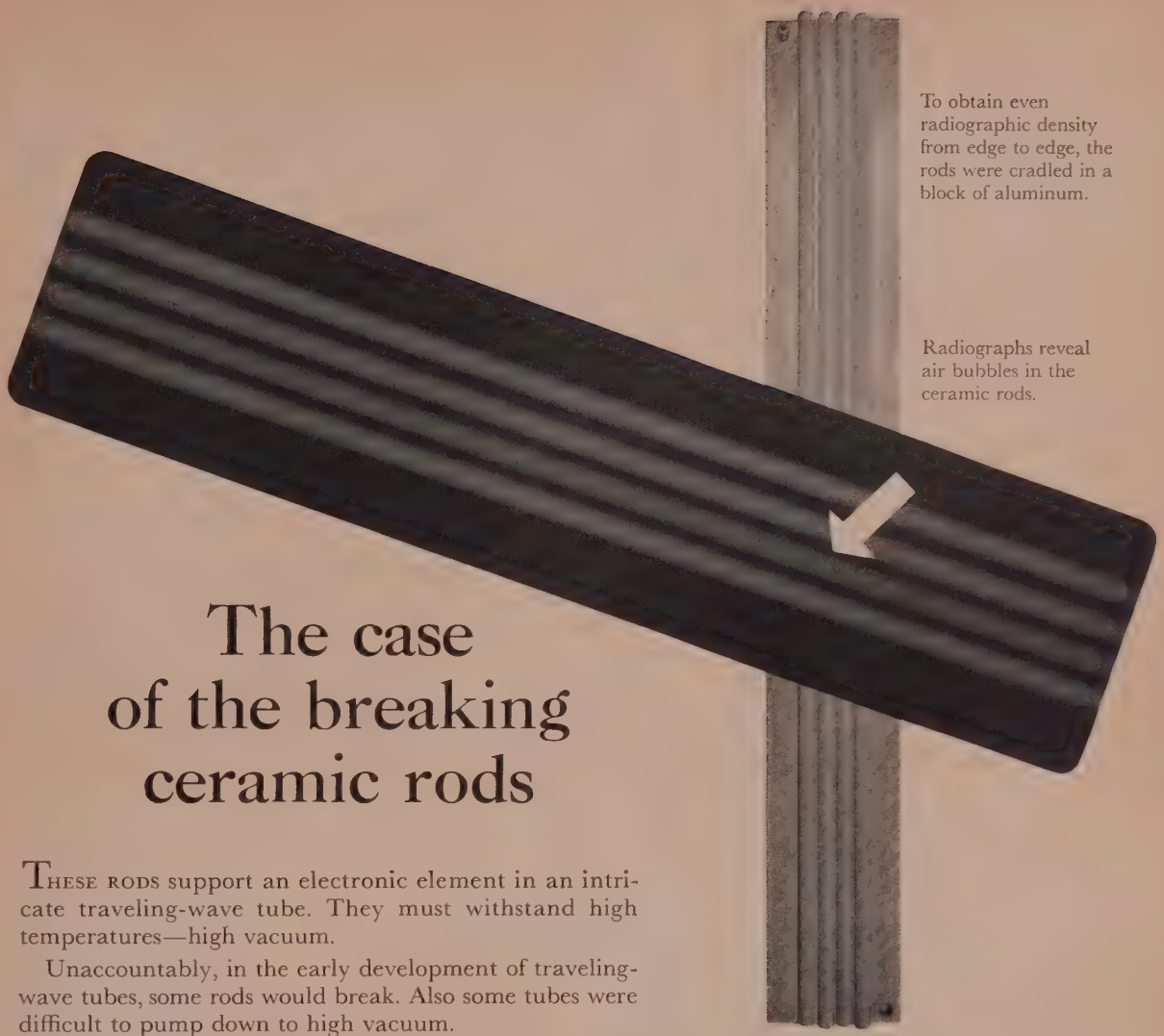
Miniature industrial **valves** with a die cast aluminum housing and a steel plunger are said to perform same work as units five time their size. Developed by the Gabriel Co., 14500 Darley Ave., Cleveland, the lightweight, full-flow valve can be used interchangeably either as pneumatic, hydraulic or vacuum. "It's the first important result of our $1 million R&D program," said president John H. Briggs.

Large transportation depots with many buildings and connecting ramps cause "climate" problems. Such systems must have careful temperature control so customers can move in pleasant comfort. This can be provided by Seazonaire **air-conditioning units** made by Marlo Coil Co., 7100 S. Grand Ave., St. Louis. Units have apparatus which cleans air, controls temperatures, and provides circulation and ventilation. Aluminum coils have 10 continuous fins per inch.

Aluminum's advantages in home decorating have been adopted for **flower planters** by the Muncie Metal Spinning Co., 1012 E. 20th St., Muncie, Ind. All models come in gold-anodized aluminum, with some in a silver satin finish. Standing models come with hairpin legs. Line includes arrangement baskets, window ledge planters, table planter sets and standing units for floor plants.

The West Coast will soon have an addition to its growing aluminum industry representatives. Texas Aluminum Co. has chosen a Mojave site, in Southern California, for its new **fabricating plant.** The firm already has an integrated extrusion plant in Rockdale, Texas. Furnaces and other extrusion equipment are expected to be in operation this spring. Extrusions will be primarily for building products.

Modern **baseboard heating** using radiant glass has been combined into a new product by Allied Precision Industries, 425 Stevens, Geneva, Ill. The new product is made of anodized aluminum with a rust- and tarnish-proof brass finish and a heating element of Corning Pyrex Glass. Sections can be joined at corners or set end-to-end. Accessory items include thermostat section, duplex electrical outlet section and inside corner section. Elements operate at 240V and 650W, and are 7-3/16-inches long and 2¼-inches thick.



To obtain even radiographic density from edge to edge, the rods were cradled in a block of aluminum.

Radiographs reveal air bubbles in the ceramic rods.

# The case of the breaking ceramic rods

These rods support an electronic element in an intricate traveling-wave tube. They must withstand high temperatures—high vacuum.

Unaccountably, in the early development of traveling-wave tubes, some rods would break. Also some tubes were difficult to pump down to high vacuum.

To find the reasons, Sperry Gyroscope Company turned to radiography.

The radiographer employed a filter device to obtain even density from edge to edge of the radiographic image of the rods. The defective rods were found to contain tiny air bubbles which expanded when the tube was heated and caused the breakage. They also were the cause of the difficulty in degassing the tubes.

In the inspection of assemblies, of castings, of welds, radiography provides a reliable means of examining internal conditions and making sure that only high-quality products are delivered. Often it suggests ways of improving manufacturing methods and cutting costs.

Would you like to learn how radiography can work profitably for you? Talk it over with an x-ray dealer or write for a Kodak technical representative to call.

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# Useful Data

**"Aluminum for Architecture"** offers guidance in selecting alloys and finishes for a vast array of building applications. The booklet, produced recently by Olin Aluminum contains guides to mechanical finishes, with a listing of the designations set up by Olin and their counterparts as established by the National Association of Architectural Metals Manufacturers. There is a description of the various surfaces and how they are obtained. Electrochemical, chemical and applied finishes are also detailed. Other sections include protective measures against electrolytic corrosion, the maintenance of aluminum, and engineering properties of aluminum alloys. For copy write Gayle Maile, Olin Mathieson Chemical Corp., 400 Park Ave., New York 22.

**Colloidal dispersions** for metalworking applications are detailed in Bulletin 426 by Acheson Colloids Co. Cost-cutting advantages of "dag" dispersions are explained. Mixtures can be used for forging, wire drawing, extruding, piercing, cutting, press fitting, deep-drawing, stretch-forming and spinning. Its use as a machine lubricant is also covered. The various water and oil vehicle mixtures are described and uses explained. For bulletin write T. A. Treleaven, Acheson Colloids Co., Port Huron, Mich.

**Super purity aluminum** (99.992% minimum) and special super purity alloys, Raffinal and Reflectal, are detailed in booklet by Aluminum Foils Inc. Information includes analytical specifications for Raffinal, mechanical and physical properties of Raffinal and Reflectal and a discussion of how these materials can be used. Reflectivity is covered and a table compares electrochemically brightened and anodized Reflectal with other reflective surfaces. Corrosion resistance, workability and proper methods of handling these alloys are also discussed. Write Herbert Fleming, Aluminum Foils Inc., 1100 Richmond St., Jackson, Tenn.

**Special shapes and felt** not wet by aluminum are detailed in pamphlet by Refractory Products Co. W.R.P.-X shapes and felt are resiliant insulators that will stand temperatures in excess of 2000 F. They resist fire, spalling and have low shrinkage, and can be sawed, drilled or sanded. Line includes tubes, launder linings, floats, pouring basins and spouts, etc. Contact E. E. Woodruff, Refractory Products Co., 910 Custer Ave., Evanston, Ill.

**"Screw Machine Stock . . . Estimating and Operating Data"** is a 120-page manual prepared for the screw machine industry by Alcoa. Three sections cover properties, specifications, estimating information and shop

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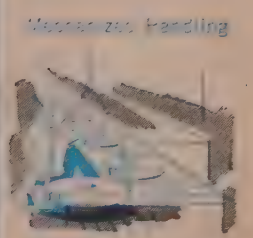

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practices for machining aluminum. The book charts such problems as machining feeds and speeds, hourly production rates, weights of segments of spheres, rounds and hexagonals and of truncated cones and circular segments. Also included are limiting dimensions, tolerances for different drilled holes, defects and their causes, government and aeronautical material specifications, and mechanical and physical properties of aluminum alloys compared with brass and steel. Aluminum Co. of America, 1501 Alcoa Building, Pittsburgh 19, Pa.

**Magnesium** in the electronics industry is discussed in a new booklet by the Dow Chemical Co. Three ways magnesium can aid electronic design and manufacture are detailed as are elevated temperature alloys which widen the metal's use. Damping capacity, range of finishes and joining methods are all discussed and illustrated. A special section pictures electronic items which already are succesfully using magnesium components. Contact The Dow Chemical Co., Midland, Mich.

**Aluminum soldering information** is presented in a new booklet by Reynolds Metals Co. This addition to the firm's series of technical brochures is a handy-sized reference including data on soldering fluxes, irons and flames. It gives complete information on actual soldering methods such as hot plate, dip, furnace, friction, glass fiber brush and ultrasonic operations. Types and properties of aluminum solder are explained, plus the corrosion of soldered joints and their performance in aluminum. Text is supplemented by diagrams. For "Soldering Aluminum" write Reynolds Metals Co., Dept. PRD-6, Box 2346, Richmond 18, Va.

**"Some More Good Things to Know About Metal Cleaning"** is a guide to the broad line of cleaning materials of Oakite Products, Inc. Included in subject matter are sections on the chemistry and techniques of cleaning; tank cleaning, barrel cleaning, cleaning in spray washing machines, preparing metal for paint, pickling, deoxidizing, etching, rust prevention, and many others. Write Edward Carlson, Oakite Products, Inc., 24 Rector St., New York 6.

**"How Aluminum Foundries Estimate Casting Weights"** was published by the Aluminum Foundry Div'n of the Aluminum Association. Procedures employed in computing weights, the basis for quotations, are outlined. Write to The Aluminum Association, 420 Lexington Ave., New York 17, N. Y.

**Automatic finishing machines** are covered in two bulletins by Hammond Machinery Builders Inc. Number 50 deals with automatic polishing and buffing machines that are said to have speedy indexing, and variable work spindle speeds and dwell time. Heads for grinding, polishing, buffing and deburring are

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## Oakite DRAW CLEAN "M" gives smooth drawing of aluminum, cleans off fast

Using Oakite DRAW CLEAN "M" lubricant means a lower reject rate on drawing and forming aluminum. Reason: It clings to metal so tenaciously that pressures of 40 thousand psi, encountered in drawing and punching cannot wipe it off. The thinnest film will prevent seizure that leads to build-up, galling, and scratching.

All ingredients are soluble and, at annealing temperatures, volatile. This means that while it clings where most compounds wipe off, nevertheless, it is most easy to remove when necessary. And the residue, if left on, is not harmful to metal or personnel.

Oakite DRAW CLEAN "M" lubricant offers astonishing savings. By diluting with water in ratios as high as 1 to 9 it extends die life three times the previous experience. Miscible with both water and oil, it is adaptable to any of the following:

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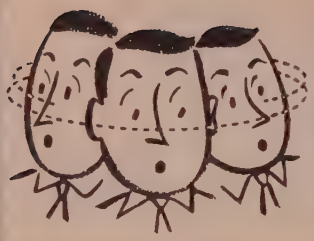

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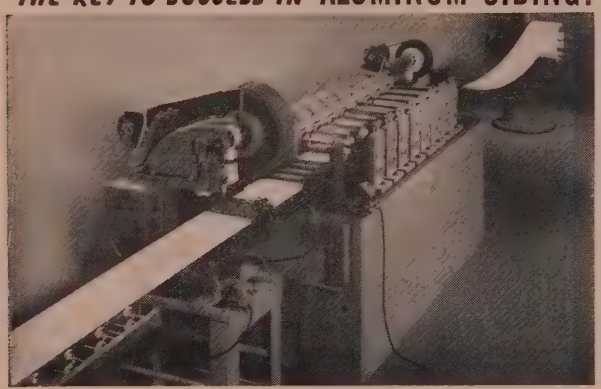

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*For full information about the Color Bound Plan, write to:*

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illustrated and information on them listed. Advantages and technical information on other finishing equipment and accessories are also included. Bulletin 435 discusses a reversing straight-line automatic finishing machine for extrusions, trim, mouldings and other shapes. Various models are detailed. Write W. C. Johnson, Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo, Mich.

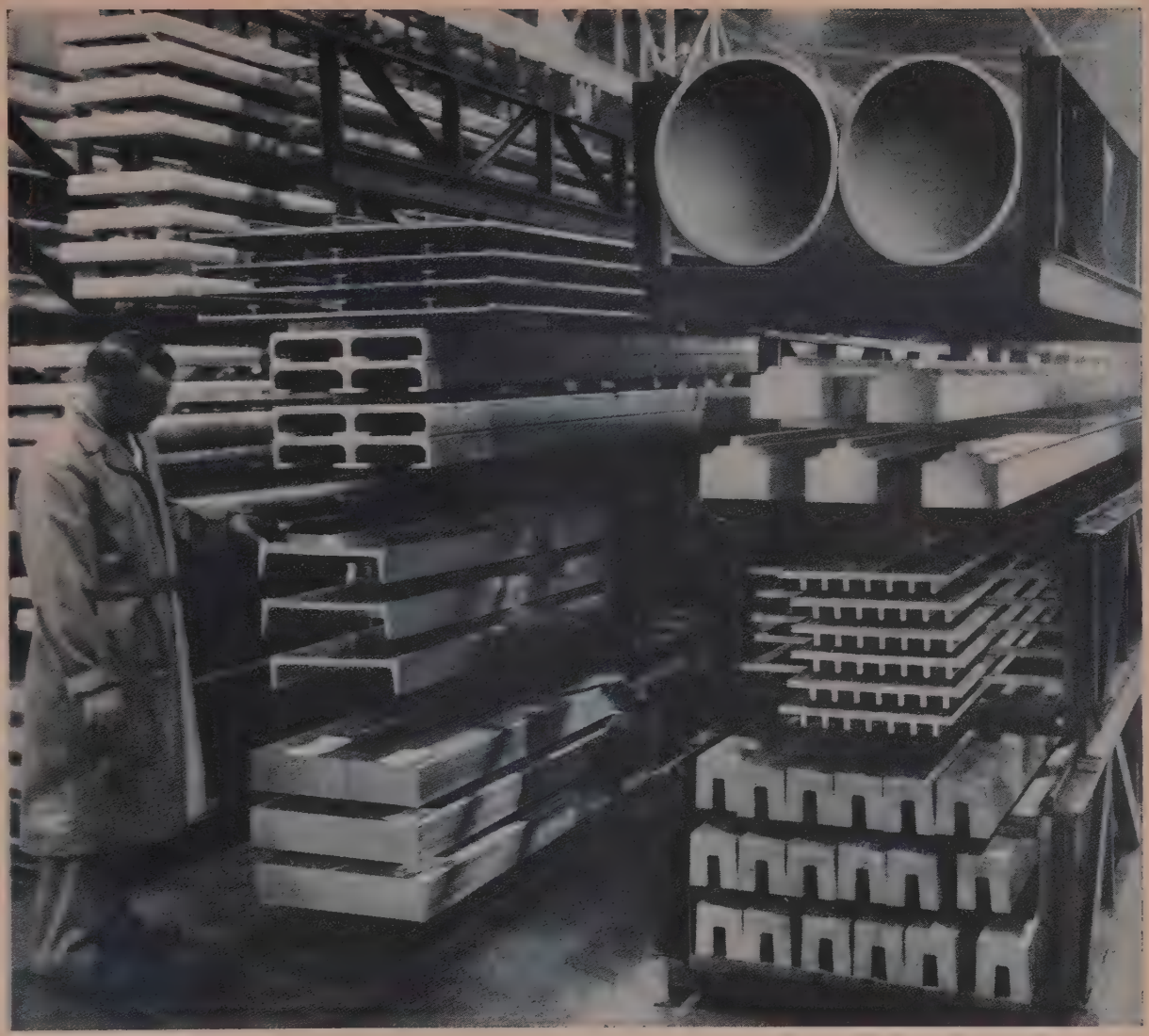
**Billet producing operations** of Robert Russell Metals Inc., are described in new brochure. Pictures and text show how materials are handled, how molten aluminum in direct chill molds forms cylindrical logs and how logs are then made into billets. A section tells how spectrometer reader guards billet quality. Contact Robert Russell, Robert Russell Metals Inc., 5761 N. West 37th Ave., Miami, Fla.

Annotated **equilibrium diagrams** of some aluminum alloy systems have been published in book form by Britain's Institute of Metals. The book contains diagrams, discussion and references on 20 binary systems and 12 ternary systems. The hardbound manual sells for $4.65. Ask for series No. 25, when writing The Institute of Metals, 17 Belgrave Square, London S. W. 1, England.

**Electric melting and holding furnaces** for the aluminum alloy foundry are covered in pamphlet by Ajax Engineering Corp. Furnaces are for metals used in die casting, permanent mold and sand casting foundries. The induction furnace has a hearth of non-metallic refractory material; holds the metal under constant gentle movement; has a temperature control which keeps metal almost at melting point. Other facets of furnace are discussed and power rating, preferred use, hourly melting rates and holding capacity are given for all models. Furnace and cubicle dimensions are included. Write Ajax Engineering Corp., Trenton, N. J.

**King inert-gas welding wire** is discussed in new booklet released by Kaiser Aluminum & Chemical Sales Inc. The process is described and availabilities listed. The King spooled wire is a continuous consumable filler wire. Also detailed in book is King filler rod for inert-gas tungsten-arc welding. Information includes packaging and care of welding wire. Write Dept. NR-22, Kaiser Aluminum & Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.

**"Design Forecast"** is an Alcoa semi-annual hardbound magazine intended for designers and design-minded business executives. It covers design in general and aluminum in particular. Objectives are to provide information to the designer about aluminum and to help clarify the designer's relationship with his corporate clients. The first issue includes information on patterns in aluminum mesh, alloys for the designer and 10 other articles. One copy costs $2.95, subscription for both issues is $5. Write Aluminum Co. of America, 1501 Alcoa Building, Pittsburgh 19, Pa.



# BIG EXTRUSIONS

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**reduce weight**

**lower assembly costs**

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*A major independent producer of quality aluminum in all alloys and sizes: Pig, ingot, billet, rod and bar, pipe, tube, hollow sections, press forgings, forging stock, hand forgings, impact extrusions, electrical bus bar, structurals, special shapes, light and heavy press extrusions, screw machine and other aluminum products. Similar products in titanium, zirconium, and steel.* HARVEY ALUMINUM SALES, INC., Torrance, California.

HARVEY Aluminum

# To build a gas station in five days . . .

. . . use the modular aluminum panel system developed by Olin's Metals Division and American Metalcore Systems. Panels are light, sturdy, attractive, weatherproof, quickly and simply erected by unskilled workers. Building is easily expanded or dismantled and moved. Big potential in schools and other buildings.

THE PREFABRICATED modular building has much in its favor. It can be erected much faster than conventional buildings; it rarely requires skilled labor for its assembly; it can be dismantled for erection elsewhere; is capable of expansion with minimum trouble and expense; and mass production gives it a favorable unit price.

If aluminum is a basic material of such a system, added dividends accrue in the form of lower shipping and erection costs compared with steel, and appreciable maintenance economies.

Such advantages have excited the interest of many companies, the latest being American Metalcore Systems, Inc., Baltimore, which was established to make and market panelized modular buildings which will make substantial use of aluminum.

An Ametco prototype, designed for auto service stations, is already in operation on U.S. Route 13, near Bridgeville, Del. The new, two-bay building can be completed from foundation to roof in five days or less, according to the Metals Division of Olin Mathieson Chemical Corp. Olin supplied the aluminum and served as material and design consultants for Ametco.

The building will save its owner $350 to $600 each year in painting maintenance costs, and can be easily disassembled and erected at a new site with virtually complete recovery of parts.

Wherever possible, the manufacturer employed new approaches to design and materials. They were after the lightest and most economical panels that would have high insulation value and exterior skins with the best color stability and abrasion resistance.

"We wanted to reduce concrete footings to a minimum," said Paul T. Day, Baltimore engineer and contractor who coordinated the project as a vice president of Ametco. "We also aimed for the simplest construction techniques and elimination of framing formerly required to support wall panels."

## Aluminum-Core Sandwich

The basic panel used for roof and walls is of sandwich construction, having a corrugated aluminum core and outer coverings of either aluminum or fiberglas. The inside skin of wall panels—or both skins in the case of interior panels—are painted aluminum sheet. Panels for exterior walls have exterior skins of Olin's 5052 alloy sheet, painted with Du Pont Lucite acrylic or Lucite reinforced with fiberglas.

These sandwich panels weigh 2½ pounds per square foot, have insulating properties equal to several times their dimension in masonry, measure a nominal 40 inches wide, and range from 8 to 15 feet long. Maximum clear span from floor to underside of the steel girders is 13 feet, 8 inches. The panels will withstand windloads up to 80 miles per hour without supports other than the extruded aluminum edge framing and connecting splines.

The aluminum roof panels are painted on the exterior side with a finish based on Du Pont's "Hypalon" synthetic rubber—reported to have a life expectancy of 20 years. In all combinations, the panels can be produced by assembly line techniques at a central fabrication shop, trucked to the construction site, and erected by unskilled labor.

These panels are capable of spanning 8 feet under heavy live loading with a "U" factor of less than 0.12. They reduced the total deck and roof covering weight from a normal 15 to 20 pounds to less than four pounds per square foot of roof surface.

Use of the lightweight aluminum roof panels meant that less steel was needed to support the roof, that the vertical structural members could therefore be

***Prefabricated modular gas station made by American Metalcore Systems was delivered and erected in five days. Six progress photos show (left to right): (1) steel framing which was put up by four men in one hour; (2) roof panels made of Olin Aluminum sheet being handed to the top of the framework to be assembled into roof deck; (3) fitting of roof***

lighter, and hence so could the concrete foundation footings.

An insulated aluminum panel was also used for the foundation frost walls. These sheet sections are protceted with synthetic rubber coatings and extend all around the structures' perimeter to a depth of three feet below the ground.

The panels weigh about 2½ pounds per square foot, are easily handled by one man, and are assembled by interlocking splines. They also serve as a perimeter form for the concrete floor slab and as an exact template for the exterior wall and framing system.

## Sounds Mighty Simple

Ametco's description of the construction process makes panelized building assembly sound mighty simple. Obviously it presented no problems to the construction crew at Bridgeville, which Ametco stipulated had to be made up of unskilled men, without concern as to whether they could read blueprints.

"Our designs are so thoroughly detailed and described that knowledge of blueprints is unnecessary," Day said.

On the first day, a perimeter form consisting of aluminum panels was delivered to the site. Serving as it does as a framing system for the building and as a premeasured template for the walls, chance miscalculations affecting panel fit are eliminated.

By the end of the first day the concrete was in place. The operation was speeded up by the reduced size of concrete footings to support the lightweight structure. Footings were poured at the same time as the foundation.

Erection of the steel frame, featuring a special "V-Lok" system, required one hour on the morning of the following day. It arrived pre-finished. The roof and wall panels, including pre-hung door and frame packages, were in place four days later.

"All connecting edges are based on simple extruded shapes which do not require special tools or knowledge of blueprints," Day said. "The spline in each panel edge blocks water once it is calked from the outside. Alternative splines are available which permit the replacement of external calking with an extruded aluminum line."

This means that the entire building can be finished inside and out in one week from the time ground is turned for the foundation footings."

For example, Day pointed out, the splines can range from simple rectangular extruded aluminum that would be hidden from view to aluminum or vinyl plastic shapes with a colored exterior bead for decorative purposes.

Should any part of the gas station's surface become so badly damaged as to require replacement, Day said, this could be accomplished quickly and economically by inserting new panels.

Further, the structural frame is so built that additional modular framing units are easily attached. Removal of the corner sections permits the continuation of additional panels with no inconvenience to the existing operation. The roof structure can be handled in the same way — without interrupting business, with no dirt or debris, and at catalog costs that simplify the owner's estimate of expansion expenses.

"Should it become desirable to move the building to another site," Day continued, "dismantling could be done as easily as erection, with almost 100% salvage of components. No special carrier would be needed for moving the frame members, panels and other parts."

Olin's Metals Division supplied about 5600 pounds of aluminum flat and corrugated sheet and extrusions. The aluminum producer also contributed engineering and panel design counseling, metal research, and testing of the sandwich sections. Olin's metallurgical research laboratories at New Haven, Conn. assisted in the selection of aluminum alloys and extrusions.

The laboratories also made the necessary engineering tests of the frost wall sections and wall and roof panels, besides testing the adhesives used in bonding the panel components. They also tested for insulation values.

Though not included in the prototype, subsequent Ametco gas stations will be equipped with heavy, bare aluminum plate in the service areas, thus giving a corrosion-free surface having high impact resistance and the ability to take hooks and other attachments.

Day noted that although the washrooms could be finished in a variety of ways, research and experience had shown that use of porcelain-on-aluminum afforded all the finish and color variety and durability needed, and could be drilled and worked without loosening the ceramic-aluminum bond.

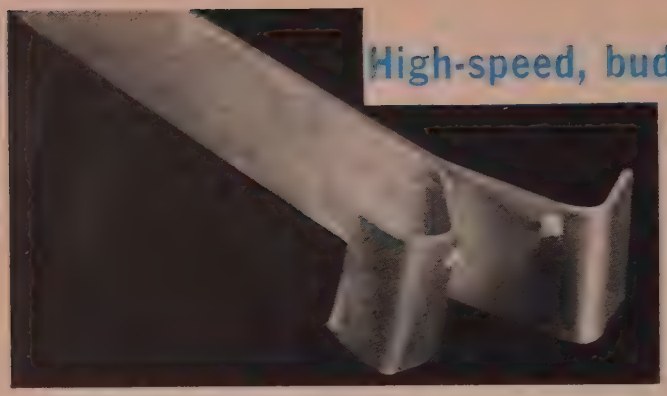
Ametco engineers have found that their design can be adapted to any of the gas stations built in the U. S. each year. In the Bridgeville station, the design freedom offered by the modular panels enabled the manufacturer to satisfy both the architectural requirements of the local gasoline distributor and the special external design features which the parent oil company (Sun Oil) has standardized for its stations.

## Maybe for Schools, etc.

As a result of the success of the Bridgeville station, Ametco has decided to produce the panels commercially. Although they have been initially identified with gas station construction, engineers feel that these panels can make a great contribution to other types of industrial and institutional buildings.

In schools, for example, the system would provide for easy expansion or contraction in size. If needed on a new site because of population shifts, the entire structure could be easily dismantled and reassembled. In the event of rapid population growth the addition of more classrooms would present no great problem.

***deck panels by means of connecting extruded splines; (4) aluminum and fiberglas panels being installed on framing (panels have thermal qualities equal to thicker masonry walls); (5) installation of interior wall panels; and (6) the finished building, trim and sturdy, has all the advantages of prefabricated, modular design.***



# High-speed, budget-priced 'spike' welder . . .

## . . . puts production welding of aluminum within reach of firms that can't afford heavy-duty equipment.

← *Qualification welds made in ⅛-inch aluminum strips with 1/10 the power needed by conventional welders.*

QUICK, easy and economical spot welding of aluminum may soon be brought within the range of metalworking concerns that cannot afford or justify the investment in heavy-duty equipment normally required for this job. A new type of welding machine developed by Weldex Division of The Metal/Craft Co., 3300 Doris, Detroit, may provide the answer to many aluminum joining problems.

The Weldex "spike" welder produces 100,000-plus ampere pulses of approximately one millisecond duration – without additional service lines. This delivery of massive current within a fraction of an instant enables the Weldex unit to perform jobs that would usually require much heavier equipment, the company explained.

### Up to 500 Welds per Minute

In addition, the Weldex can operate at speeds at up to 500 welds per minute, will join precoated metals without damaging the coating, and will even weld tiny electronic components without harming them.

According to Don Dunnabeck, president of Metal/Craft Co., the Weldex unit will perform qualification welds in joining ⅛-inch thick aluminum stock, a job that normally requires 200 KVA welders. In many areas, this amount of power is not available he explains, and where it is, a transformer must be adjacent to the welder.

"We feel that this ten-fold reduction in power requirements will bring qualification welding of aluminum within reach of plants in areas of low power availability, and to plants that are unable to invest heavily in large welders of restricted use," Dunnabeck declared.

Because it has minimum electrode temperature build-up, the Weldex unit is said to reduce electrode pickup on aluminum or zinc coated metals, reducing downtime for cleaning electrodes.

Weldex engineers say that their "spike" welding method combines the advantage of normal spot welding capacitor discharge welding and percussion welding, yet eliminates or nullifies their disadvantages.

Capacitor discharge welding has some advantages over conventional 60-cycle resistance welding. For example, a great amount of power is fed through the work in a very short time. This short time–large power action develops less heat in the weld area because of the shorter time, and permits greater power handling capabilities from the transformer due to the low duty cycle.

But a disadvantage of conventional capacitor discharge welders is that it takes a second or so for the capacitor to charge. Thus, the welder must be operated at a slow rate of one pulse every second.

With the "spike" method capacitors are arranged to give 120 pulses of short duration (one millisecond) current every second, which gives a rise time through the transformer at a frequency of about 500 to 800 cycles. Thus, the transformer can handle much greater peak power than when welding on straight 60 cycles. Line demand is correspondingly low.

■ *The Weldex "spike" welder produces qualification welds in aluminum with 1/10th the normal power, runs at speeds of up to 500 welds per minute, costs about $7000 without fixtures.*

Because of the short duration of current pulses, heat generated in the total weld zone is very low and concentrated at the surface to be welded. Because of the time element, heat does not spread throughout the work. This makes the Weldex unit capable of critical welding of small components in which too much heat could damage, say, delicate electronic elements.

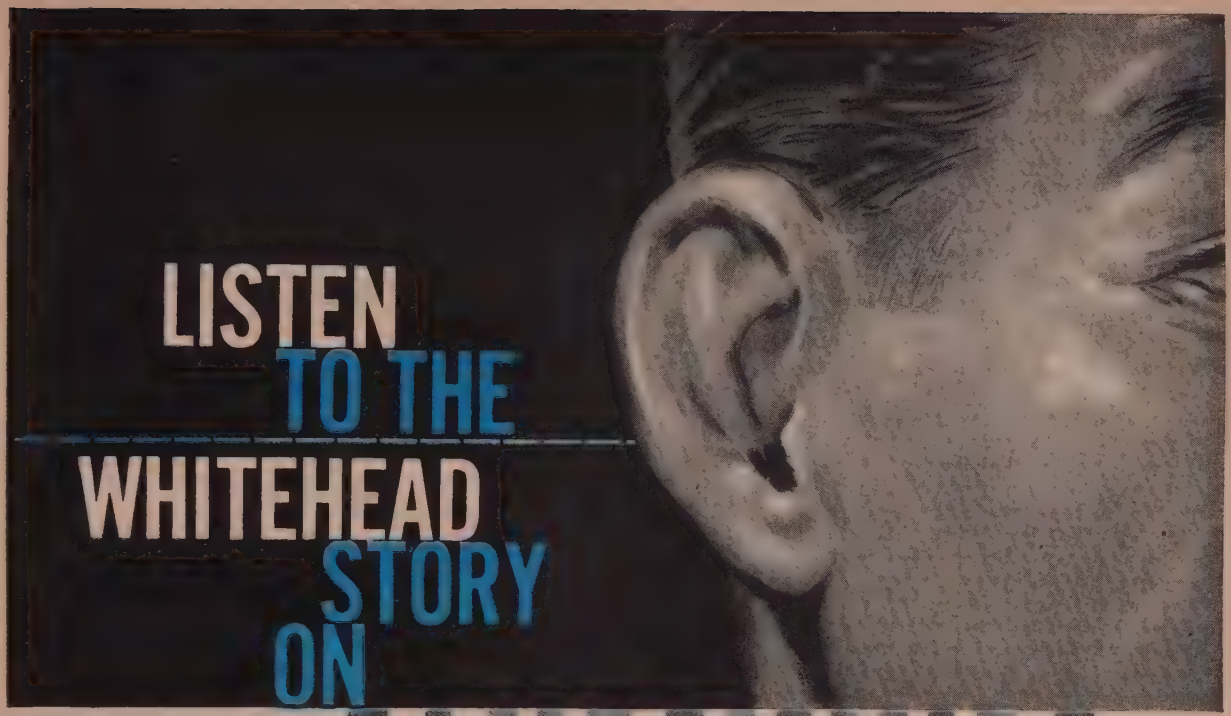
An early Weldex installation was in a transistor manufacturer's plant. With conventional welding techniques in joining the case and base, this firm suffered 20 to 30% scrap loss due to excessive weld heat. This loss has been practically eliminated, according to Weldex spokesmen.

Maximum current is generated in the transformer when the capacitors and ignitrons are allowed to "fire" and "charge" at 90 degrees on the voltage wave. This gives both greatest voltage and greatest current. Weld current is adjusted for critical applications by the use of the heat or phase shift control which is furnished with every "spike" welding machine. This control allows the capacitors to be charged later on the voltage wave, thus giving an infinite degree of power control.

### The Tab: $7000 Apiece

Several Weldex "spike" welders have been in operation for the past four months or so, performing production welding of various types of jobs. Marketing of the equipment has been held up, company spokesmen say, pending results from these first applications.

The company is now prepared to start marketing the new machines, starting with standard production units without special fixtures. These carry a price tag of under $7000, Dunnabeck points out, "and we expect this low price range to open new fields for welding in the manufacture of luggage, furniture, appliances, automotive parts, aircraft, and electronics equipment."

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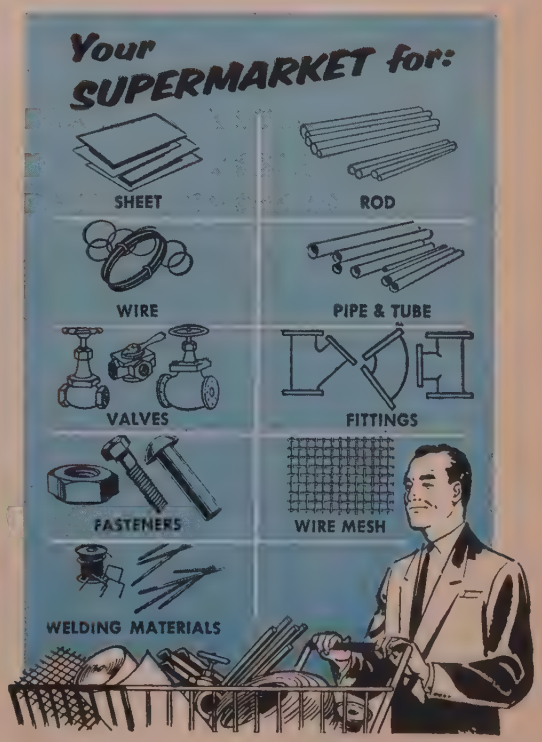

# *It was another record year for* NORWAY'S FLOURISHING ALUMINUM INDUSTRY

**Primary output rose 19% to 145,000 metric tons last year. Capacity will hit 230,000 tons in next few years, making Norway Europe's biggest aluminum producer. Opportunities seen in new European Free Trade Association.**

• by Nils Ramm, Managing Director, Aktieselskapet Norsk Aluminium Co.

NORWAY'S production of primary aluminum increased nearly 19% in 1959, amounting to approximately 145,000 metric tons. This compares with the 122,000 metric tons in 1958.

Thus, Norway's production of primary aluminum has reached the same level as that of West Germany, but is somewhat lower than that of France. the biggest European producer of aluminum at present. In the course of a few years, however, when present projects have been completed, Norway will be the largest producer of primary metal in Europe, with a total capacity of approximately 230,000 tons.

Exports of primary aluminum in 1959 will exceed those of 1958, which were 110,000 tons, and represent some 8% of Norway's entire export volume. It is interesting in this connection to recall that Norwegian exports of primary aluminum in 1947 were 16,000 tons.

The only Norwegian manufacturer of aluminum semi-finished products, A/S Nordisk Aluminiumindustri, operated at full capacity last year. Sheet, circles, and strip were produced for the local market and for exports, which now amount to approximately 35% of the total output. Sales of aluminum finished goods set new records in 1959.

A/S Nordisk Aluminiumindustri has adopted a new line of production—Roll Bond aluminum panels and evaporators for refrigerators and deep freezers. The company is the sole manufacturer of these products in Scandinavia and has already exported large quantities, especially to Denmark.

Total national consumption of aluminum in Norway now runs about 15,000 tons per annum, or 9.2 pounds per capita. For comparison the corresponding per capita figures for other countries are the following:

| | Lbs. per Capita Approx. |
|---|---|
| U.S.A. | 25.5 |
| Switzerland | 16.5 |
| Canada | 13.4 |
| U.K. | 12.7 |
| Sweden | 10.8 |
| West Germany | 10.3 |
| France | 7.9 |

Norway is one of the "outer 7," which have countersigned the agreement of the European Free Trade Association. The present status of the aluminum industry in these countries, from the point of view of customs, is that primary aluminum is imported duty-free in Denmark, England, Norway and Sweden. In Austria, Portugal and Switzerland imports of the metal are subject to duty.

The major part of Norway's exports of primary aluminum to the other countries within the "outer 7" goes to Denmark, England and Sweden. For Norwegian exports of primary aluminum, therefore, the establishment of a European free trade area would have been of greater importance than the smaller group of the seven countries.

Norway is the only European country with no tariffs on imports of aluminum semi-finished products. The Norwegian aluminum semis industry exports considerable quantities of its products to the other Scandinavian countries and even to continental countries, despite tariff walls.

Status of the Norwegian aluminum semis industry in the Free Trade Association consequently is rather favorable. However, large continental rolling mills have modernization and expansion plans which undoubtedly will be experienced even in Norway, as there will be no common tariffs of the Free Trade Association countries on imports from outside countries.

Harmonization of import duties of the Free Trade Association would have been of great importance to the Norwegian aluminum semi-finished products industry.

Imports of aluminum household articles in Norway are subject to customs, 14% of the value. For imports from the other countries of the Free Trade Association these duties gradually will be reduced to nil. Norwegian manufacturers of aluminum household articles, therefore, must be prepared; competition in this sector of the market will be sharper because of imported cheaper aluminum goods.

The other countries of the Free Trade Association have high import duties to protect their aluminum finished goods industries. In spite of this, Norwegian exports of such goods to these countries have been substantial, and opportunities of increased exports seem to exist.

Summing up, the position of the Norwegian aluminum industry in the Free Trade Association seems to be strong. An integration, however, of the two trade groups would represent even greater possibilities for the Norwegian aluminum industry, especially for the primary aluminum producers.

For 1960, the industry is looking forward to continued growth in the consumption of aluminum in old and new applications.

■ *New primary smelting facilities such as an addition to this 13,500-ton plant at Hoyanger make Norway the fastest growing aluminum producer in Europe. Plant is operated by Aktieselskapet Norsk, one of Norway's five producers.*

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# 2 HEVI-DUTY ELECTRIC FURNACES

At the Appleton Wire Works Corp., Appleton, Wisconsin, two Hevi-Duty electric strand annealing furnaces bright anneal up to 22,000 ft. of brass and bronze wire per minute at temperatures to 1500° F. The wire is used in the weaving of wire cloth for the paper and pulp industry.

Designed for maximum operating temperatures of 2000° F., each Hevi-Duty furnace has 40 alloy tubes through which the wires pass, and three zones of temperature control. Wire is annealed under a dissociated ammonia atmosphere.

These Hevi-Duty furnaces are in operation 120 hours per week, and this company reports significantly low operating costs. Temperature uniformity of ±5° F. along the heated length of all tubes has extended tube life by eliminating hot and cold spots.

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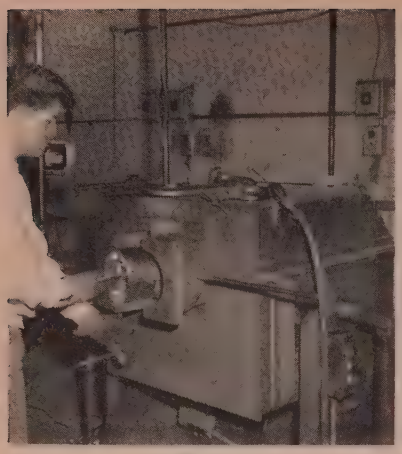


*Operator is removing high pressure Nike missile piston from mold.*

### *Controlled Pouring Produces*

# X-RAY PERFECT CASTINGS

**Akron Gravity Casting Co. uses the Wessel System of pouring aluminum, calling for closely controlled cycle in the production of high density permanent mold castings with excellent surface finish.**

**By E. I. Peck, Vice President, Akron Gravity Casting Co., Akron, Ohio**

X RAY-perfect castings of superior density and strength are produced by the Wessel system of pouring aluminum. The process is a completely controlled furnace-pour permanent mold arrangement which eliminates variables such as hand ladling by virtue of a pre-determined cycle. The result is uniformity from one casting to another.

Under the pre-set cycling of the casting furnace, the temperatures of both molten metal and the molds are instrument-controlled to within a very narrow range. Pouring and solidification rates are established and operated hydraulically under timer control. The molds themselves are specifically designed for the proper thermal characteristics to achieve progressive solidification with relation to other factors such as alloy used, shape of part, and type of coring.

The casting furnace is so designed that pouring is done at a calculated and constant rate—and from a source below the line of molten metal. This not only avoids contamination of the casting by inclusions of foreign matter, but also skirts the shrinkage problem by the continuous application of liquid metal under a gravity head of pressure.

With these controlled conditions, castings of extremely high density are achieved in standard alloys with tensile properties higher than normal. In the high purity alloys—X357, for example—yield strengths of bars heat treated to the smelters' recommendations were well above those specified for the metal. Elongation remained the same.

In the more exotic alloys such as A-750, a high tin alloy for bearing applications, the ever-present problem of segregation is practically nil, due primarily to the action of the direct pouring furnace and the mold design. In this particular alloy, both dye penetrant and microscopic inspection revealed unusually sound metal.

Design of molds is important in this process. In order to achieve the desired results, the mass of die material in certain areas is carefully calculated with relation to the adjacent mass of molten metal so as to accomplish progressive solidification. The metal solidifies at a point farthest from the furnace and solidification progresses toward and finally into the sprue. This enables constant feeding of the casting with molten material and effectively takes care of shrinkage problems.

## Molds Are Made of . . .

The molds made for production runs are constructed almost entirely of steel —in the main, CSM-2 by Crucible Steel Corp. For larger molds, where it might be impractical or too costly to use steel, Meehanite has proved a good material.

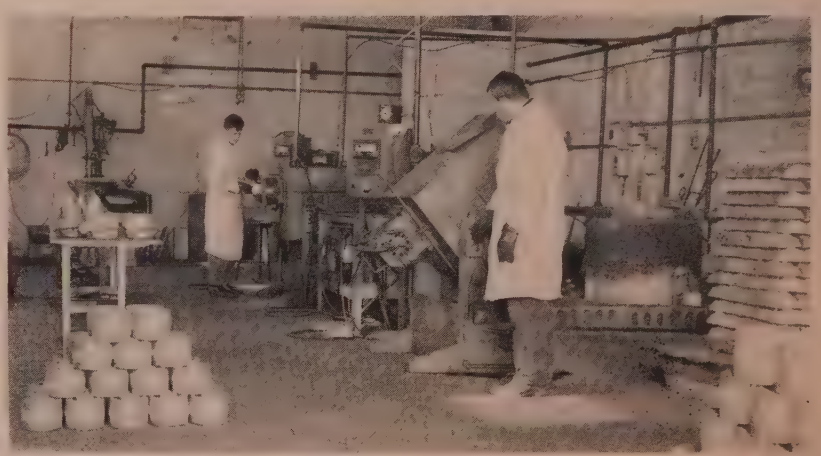
Molds for short runs or prototype dies for simpler parts may be constructed from block graphite. Far cheaper than its metallic counterparts, this type of tooling can produce castings equal in quality. The surface finish is slightly rougher, however.

All dies, regardless of material used, may be completely permanent or semi-permanent mold. Sand, shell, plaster or ceramic cores may be used, if required. Operating limit using this process is 25 to 30 pounds; dimensional limit is a 24-inch diameter.

Tolerances can be held very closely. Plus or minus a few thousandths is common. The metal simply fills the die cavity. Careful shrink calculations and a careful diemaker are the prime requisites for holding tolerance, and careful mold preparation prior to pouring.

Surface finish of parts cast by this process could be termed comparable, in general, to that of a pressure die casting. However, in some cases where a heavier refractory is indicated such as on long, very thin sections, the finish would show approximately 100 microinches. Where very fine surface finishes are required a great deal of success has been achieved using a standard commercial mold preparation, "Aquadag" (Acheson Colloids Co.).

Combined with the use of excellent coatings, however, is the fact that top quality work must be done in the die cavity, with care and cleanliness always observed in the casting operation.



■ *Wessel furnaces tilt to pour molten aluminum into attached molds. Castings in foreground are carrier-based aircraft tail wheels having a unit weight of about 9½ pounds. Production rate: a minimum of 100 wheels per 8-hour shift.*

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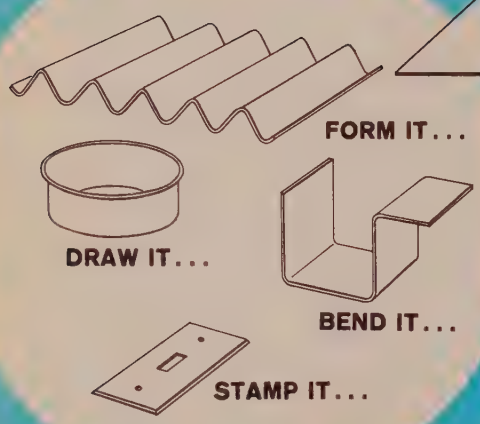


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*Du Pont's registered trade mark for its acrylic lacquers.

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# HOW INDUSTRY CAN USE magnesium grating.....

**High strength/weight ratio, plus good resistance to alkalis, make magnesium the ideal material for many industrial grating applications. Speech given at Magnesium Association meeting details history, properties, advantages, uses of promising new magnesium product.**

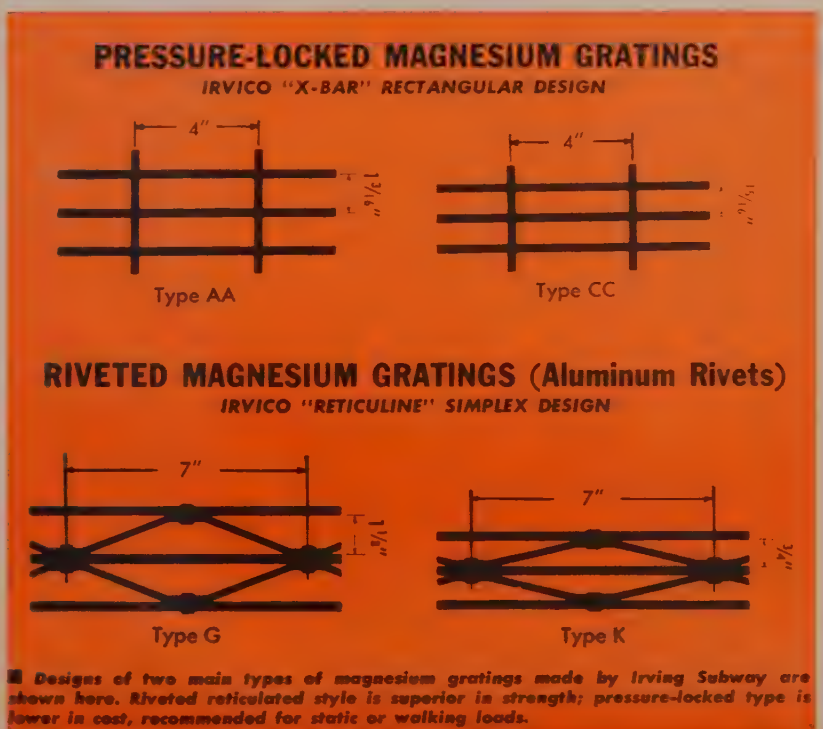
by Milton Van Dyke, Engineering Department, Irving Subway Grating Co., Long Island City, N. Y.

DEMAND for a strong, lightweight flooring to be used in the New York City subway system at the turn of this century was responsible for the "open, structural metal flooring" industry. Technical problems involving design, materials, machinery and manufacturing were solved after tedious experimentation by Water E. Irving, a graduate of the School of Civil Engineering, Rensselaer Polytechnic Institute.

Originally, open flooring consisted of steel bars braced together in makeshift fashion to form a grating effect. However, with the solution of the engineering problems, manufactured flooring emerged. Extensive educational engineering data programs have created innumerable markets for this product. Once the markets for industrial open mesh flooring had been developed, Walter Irving explored the possibilities of applying it to bridge decking.

The depression presented serious problems to municipal governments. Relief costs were constantly depleting current funds, thereby necessitating stringent budgets. Repair of bridges had to be undertaken at the lowest possible cost. After a series of experiments, Irving succeeded in convincing John A. Dunford, bridge engineer of Seattle, Wash., to install open bridge decking on the University Bridge in that city. The test proved successful.

Irving Subway has been an innovator in the grating industry for over 50 years and is once again pioneering a new product. Industry's demand for lightweight decking prompted Irving to investigate magnesium, and the company's confidence in the product's market potential resulted in the publishing of safe load tables and carrying inventory on certain bar sizes.




■ *Designs of two main types of magnesium gratings made by Irving Subway are shown here. Riveted reticulated style is superior in strength; pressure-locked type is lower in cost, recommended for static or walking loads.*

## Two Main Types

Open magnesium decking may rival its parent product in importance within the near future if the interest displayed by engineers and the public is any criterion. There are two types of open metal flooring, but their subdivisions are numerous. They are: 1. The reticulated or riveted design; 2. The cross bar or rectangular design. Both designs are available in magnesium (see diagram).

The reticulated type is far superior to the cross bar type because of its greater strength due to its design. The only advantage of the cross bar type is its slightly lower cost. It is used when price and light duty rather than strength are the vital factors.

Pressure locked rectangular types are recommended for walking and static loads, whereas the riveted types are ideal for vehicular or rolling loads.

The live load capacity of grating is increased when load bars of greater depth are employed or when the straight bars are riveted closer to each other. Both methods result in greater resistance to bending.

Based on the fundamental engineering principles of a rectangular beam (strength varies in proportion to the square of the depth), great economies and advantages may be realized by using the widest possible spacing of bearing bars and suiting the depth of

the members to satisfy stress requirements. The advantages are:

1. Much greater strength and stiffness for much less weight due to more efficient use of materials.

2. Improved traction due to the gripping action of a tire depressing within the mesh.

3. Better self-cleaning and self-draining properties with less accumulation of debris, due to increased percentage of open area.

A striking characteristic of this flooring is its open ventilating surface area consisting of 25% metal and 75% space. Its smooth surface is ideal for walking or wheeling. Because the material is tractional by nature, surface wear does not impair this important function. Where greater traction is necessary, the edges of the bars are serrated on the working surface.

The riveted design consists of straight load carrying members (bearing bars) held together by reticulated or crimped members (reticuline bars). The reticuline bars must be of a size and design to provide rigid lateral bracing and distribute loads evenly and efficiently over the flooring area. These properties are especially necessary for heavy concentrated loads, such as fork lift trucks.

These requirements are satisfied in a riveted grating when the reticuline bars parallel the span of the bearing bars and are only one less in number for any panel width. The trussed form of these members, which are alternately riveted to the main bars, and their proportional depth, provide excellent lateral bracing and load distribution.

Since the trussed bars parallel the straight bars, these members not only provide lateral bracing and load distribution, but also supplement the section properties of the main bars to resist flexural stresses. This permits the satisfactory use of a lighter bar size than would be required if a rectangular mesh grating was used having the same bearing bar spacing.

The openness of this material's structure affords convenient handling; hooking to cranes or other handling equipment simplifies installation and removal. The flooring is self-cleaning — all dirt, snow, rain, etc., is automatically eliminated — and it is usable immediately after placing. It admits light to places below and permits passage of air currents and fumes.

Grating floor has the highest strength-to-weight ratio of any industrial flooring, and magnesium has the highest strength-to-weight ratio of all common structural metals. Therefore, it is natural that this material be considered where light weight is a consideration.

Magnesium grating, developed in conjunction with Light Metals Associates, Norwalk, Conn., is manufactured by the Irving Subway Grating Co. in four grating types — pressure locked AA and CC; and riveted G and K. Load bearing bars are made from alloy ZK-20 extruded bar. Reticuline bars are extruded AZ31C-F.

Magnesium grating has high resistance to most alkalis, is non-rusting, non-sparking, and has the highest stiffness-to-weight and strength-to-weight ratio of any commercial grating.

■ *An all-magnesium dockboard employing Irving Type G riveted magnesium grating, serrated for improved tractional properties. Dockboard is light enough to be positioned by hand, yet strong enough to support the weight and impact of a fork lift truck carrying a 2100-pound roll of newsprint.*

### In an Alumina Plant . . .

The first large industrial application was in a new alumina plant in Louisiana. IRVICO magnesium grating was used on a portable 27-foot diameter scaling platform designed for cleaning the inside of 70-foot-tall precipitator tanks. A major reason for selecting magnesium, aside from its light weight, is its high resistance to attack by caustic solutions used in producing alumina. Other common structural materials could not stand up satisfactorily to this chemical atmosphere.

Magnesium grating also enabled designers to reduce the cost of the understructure and lifting mechanisms. The platform weighs about 4000 pounds. In steel, it would have weighed 18,200 pounds. Even in aluminum it would have weighed 6,250 pounds.

Type AA pressure locked grating was used with 1¼ x ⅛ inch bearing bars. Irving supplied 979 square feet of magnesium grating, in 56 pieces. Cutouts, banding and other special work was done by Catco, Inc., Locust Valley, N.Y. Catco also supplied other components such as magnesium beams, and assembled the job.

One of the best applications of magnesium grating is in portable materials handling equipment. Brooks and Perkins, Inc., Detroit, has designed and sold several magnesium dock boards incorporating magnesium grating. The first installation, fabricated for a New York newspaper, has been in service for over a year. The grating shows no evidence of the abuse to which it is constantly subjected (see cut).

The customer is pleased with the grating dockboard and has ordered several more. The grating keeps the board free of dirt, snow and ice, and its self-draining characteristics prevent water from running into the car and damaging the newsprint.

To the magnesium fabricator, magnesium grating has special advantages — a unitized composite structure, compatibility of materials for economical assembly, elimination of galvanic corrosion, and the promotional value of an all-magnesium product. The potential in the materials handling field, particularly on yard ramps, is excellent in view of industry's acceptance of existing grating designs.

Magnesium's low neutron absorption and low retention of radioactivity point to many atomic energy applications. When a metal is exposed to radiation, some radioactivity is absorbed and then given off to the surrounding area. But when magnesium is used for gratings in

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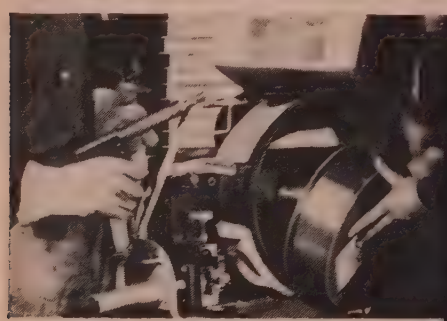

Loading 10 lb. spool of #4043 aluminum wire at Michael Flynn Manufacturing Co., Philadelphia. Aluminum in this particular spool was used in welding curtain walls for skyscraper at 2 Broadway, New York City.

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Wire goes from extrusion and light draw to ALL-STATE'S precision spooling machines where it is layer level wound for smooth, trouble-free welds.

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Precision spooled in these sizes: .030, .040, 3/64, 1/16, 3/32, 1/8.
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ALL-STATE *Spoolarc*® spooled aluminum wire meets federal and industry specifications. Spools are sealed in polyethylene bags plus desiccant to retain top quality from spooling machine to welding machine.

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a nuclear laboratory or power plant, it absorbs very little and quickly ceases to radiate back to its surroundings.

Architectural plans have necessarily included stairs where construction of more than one story was desired. Manufacturers of open structural metal flooring have therefore brought out open metal steps as an allied product. This material is similar to the flooring, can be manufactured in both reticulated and cross bar types.

Its significant difference is the attachment of a carrier which supports the step on the stringer or structural beam of the stairway. To prevent accidents, a nosing or "visableedge" bar is riveted at the edge of the step making it conspicuous, thereby eliminating the danger of overlooking the end of the step.

Magnesium grating finds wide application as cargo decking, removable flooring, walkways, pit covers, scaffolding, portable platforms, portable ramps, industrial floors, catwalks, and the like. Its properties make it desirable for petroleum refineries, aircraft plants, caustic chemical industries. electric plants, paper mills, automotive factories, steel mills, and all plants requiring a safe, light, durable open flooring.

Although we have concentrated on commercial applications, there is a large potential for magnesium grating in military and defense products — landing mats, air drop platforms, vehicle floors, bridge decking, etc. — where mobility is of great importance.

## Could Crowd Aluminum

The price of magnesium grating is very close to that of its aluminum counterpart. If the historical relationship between magnesium and aluminum prices returns to the pre-1958 level, magnesium grating can be the lowest cost lightweight grating on the market. Price is a function of expanding markets and improved manufacturing techniques. A great deal of time and effort have been spent on these objectives and we are convinced that we can manufacture this product on a competitive basis with other industrial decking surfaces.

Open magnesium flooring is comparatively new, and industry in general is accepting it as a routine product rather than as a novelty. The market has every evidence of expansion. Extruded grating may also help increase the volume of the catwalk and scaffold market.

The advent of open magnesium decking has not only struck the fancy of designers and engineers, but has also fired the imagination of the large magnesium fabricating firms. We hope that the fabricators and designers assembled here today will originate new products and equipment utilizing magnesium grating surfaces.

**TO: MANUFACTURERS OF ALUMINUM BUILDING PRODUCTS FOR NEW HOME CONSTRUCTION**

**HERE IS THE FIRST NATIONAL MARKETING PROGRAM BY A MAJOR ALUMINUM PRODUCER THAT HELPS YOU SELL FACE-TO-FACE WITH THE NATION'S LEADING PROFESSIONAL HOME BUILDERS...**

# OPPORTUNITY ALUMINUM

A program designed to help you take advantage of growing public demand — and new builder acceptance — for aluminum home building products.

KAISER ALUMINUM*

*To Build Better... To Live Better*

*Trademark Kaiser Aluminum & Chemical Corporation

# KAISER ALUMINUM'S

# "OPPORTUNITY ALUMINUM"

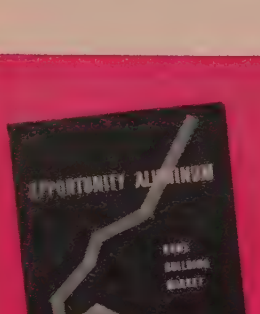
## TAKES YOUR PRODUCT TO THE BUILDERS IN TOP HOME BUILDING AREAS!

### Aluminum Building Product "Supermarkets"

To display and demonstrate to builders how aluminum products add values, Kaiser Aluminum will set up special showings of locally-available aluminum building products in each of the 16 cities. These "supermarkets," as the "kick-off" of the program in each city, will be scheduled for a meeting of the local Home Builder Association.

### Aluminum Building Product Service Centers

*Permanent* education and display centers are being established in Kansas City and Cleveland to provide continuous, up-to-date product exhibits and data for the home building industry. Educational facilities at these centers serve both the public and the builder — building recognition for the home values created by aluminum products.



### HERE'S THE PAYOFF FOR YOU:

**Exclusive Market Reports — City-By-City, Builder-By-Builder, And Product-By-Product!**

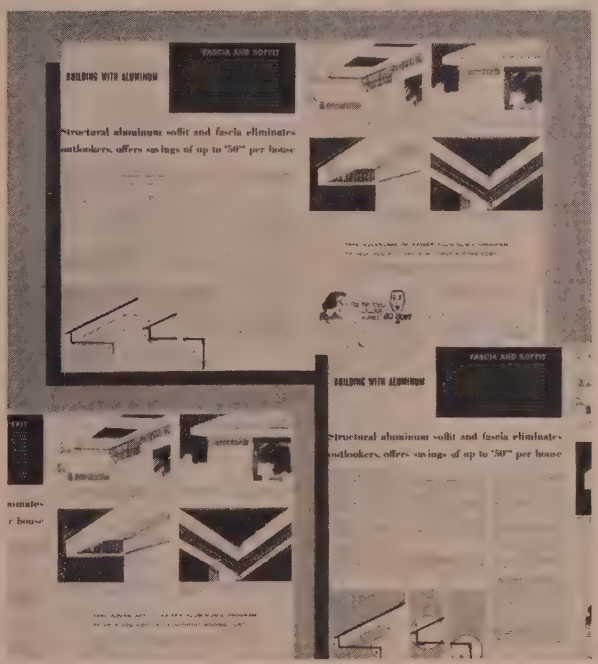
To provide a unique follow-up sales opportunity for manufacturers who are users of Kaiser Aluminum, special Kaiser Teams gather up-to-date data on actual aluminum product use *by each of hundreds of professional builders* in all 18 markets! This data will be supplied on a regular basis to aluminum product manufacturers.

*Your* opportunity with aluminum is right now! Take advantage of this all-new program by becoming a customer of Kaiser Aluminum . . . and by setting up product distribution in the 18 major markets!

Full acceptance for *your* aluminum building materials—and profitable distribution—can only be achieved *when the builders know the products.*

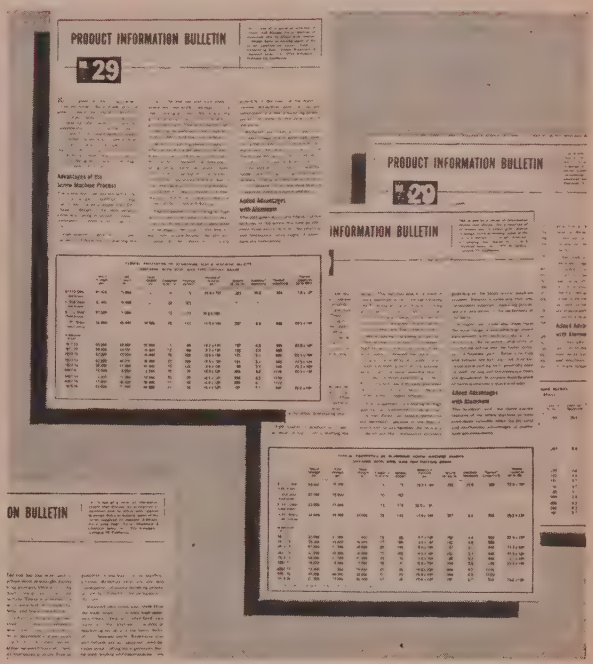
Now—through the 1960 "Opportunity Aluminum" program—products made by users of Kaiser Aluminum will be presented *directly to professional builders* in these major new housing markets:

**Seattle, San Jose, San Diego, Phoenix, St. Louis, Dallas, Hartford, Atlanta, Orlando, New Orleans, Detroit, Minneapolis, Denver, Washington, D. C., Cincinnati, St. Paul, Kansas City and Cleveland.**




**"Building With Aluminum" Advertising Series**

To stimulate builders' interest in aluminum building products, this informative advertising series will appear regularly in leading building publications. It will show details of new products, new applications, new problem-solving techniques.




**Product Information Bulletins**

To bring aluminum building material data directly to builders, a new series of Product Information Bulletins will be mailed to professional builders. These bulletins give actual "how to" information for new application techniques and for newly-available aluminum building products.

## KAISER ALUMINUM HELPS SELL YOUR PRODUCTS BY HELPING BUILDERS SELL MORE NEW HOMES

Your product is never really sold until it is sold *a second time* — as part of the builder's product, the homes he builds. So, the second part of Kaiser Aluminum's program is to help you sell your products to builders by helping the builders to sell more new homes.

KAISER ALUMINUM

*To Build Better . . . To Live Better*

*Trademark Kaiser Aluminum & Chemical Corporation

# THROUGHOUT 1960, KAISER ALUMINUM'S "MAVERICK" HELPS BUILDERS EVERYWHERE SELL NEW HOMES!

"Maverick"— with more than 40,000,000 viewers every week — holds the largest audience of any Sunday-evening TV entertainment! Starting early in 1960 and continuing throughout the year, this vast audience will be watching commercials that sell a better way of living in a new home... and that show the new features and values that make 1960 the year to buy!

(James Garner and Jack Kelly are Warner Bros. stars.)

## SPECIAL 16-MARKET CAMPAIGN SELLS FOR THE PROFESSIONAL BUILDERS YOU SELL TO

In the same 16 major housing markets that Kaiser Aluminum helps open up for you, special commercials on "Maverick" will deliver *local impact* to increase model-home traffic for builders!

This special TV campaign, concentrated in the Spring selling season, will be backed by a complete supporting program — outdoor advertising, exciting new "high-fidelity" color newspaper pages and a series of follow-up two-color newspaper advertisements.

## BUILDERS CAPITALIZE AT POINT OF SALE

Builders who participate in the program by using eleven or more aluminum products in their homes, receive individualized "point of sale" material that gives direct tie-in with the selling campaign — poster-like site signs, "sold" signs, "prospect portfolios," special "buy now" brochures that help sell the values of aluminum. *Your aluminum!*

SEE THE 1960 DALLAS HOMES... GO BUY!
DON'T GO BY... BUY NOW!
A PROFESSIONALLY BUILT HOME
ANTHONY, INC.
SOLD
DON'T GO BY... BUY NOW
ANTHONY, INC
THE SMARTEST MOVE YOU CAN MAKE

## EXPAND YOUR "OPPORTUNITY ALUMINUM" NOW!

This program is opening up fertile new markets in the *home building industry* . . . and a share in this tremendous sales opportunity is open to any manufacturer of quality aluminum residential building products who is a user of Kaiser Aluminum.

Call the Kaiser Aluminum Sales Office listed in your telephone directory for details of how *you* can capitalize on this expanding program!

KAISER ALUMINUM

*To Build Better . . . To Live Better*

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**Kaiser Aluminum & Chemical Corp.**
**300 Lakeside Drive, Oakland 12, California**

See "MAVERICK" • Sunday Evenings, ABC-TV Network • Consult your local TV listing

# ALCOA ENCOURAGES KIDS

# *to design it in aluminum*

**Student competition stimulates tomorrow's design engineers to think in terms of aluminum; creates fresh approach to old problems; typifies Alcoa's continuing courtship of design profession. Winning designs include minimum transport vehicle, transportable modular homes, egg dispensing device, collapsible tubular roof system, fanciful gum dispenser. School faculties picked winners.**

IMAGINE thousands of office workers putt-putting to and from work on small motorized scooters resembling the crude contraption you once made from a roller skate and a short length of two-by-four.

Or imagine a house that is quickly assembled from complete room "modules" that have been hauled to the homesite on flatbed trailers.

Or imagine a simple machine that neatly dispenses shell-less eggs that have been sealed in a long aluminum foil "ribbon" of individual pouches.

These and other minor wonders may well come about as the result of a unique student design competition sponsored by Aluminum Co. of America. The program is another facet of Alcoa's continuing courtship of industrial designers. In this case, however, the aluminum producer is out to sell them on aluminum while they're young.

## Contests in Five Schools

Competitions were sponsored at five design schools, each of which was assigned a specific product category. Alcoa's only requirement was that aluminum figure prominently in the student designs. Winners, chosen by the school faculties using their own evaluation systems, were not only awarded certificates, but will also be honored in slick advertisements in *Industrial Design* magazine.

"In effect," comments Sam Fahnestock, Alcoa's chief industrial designer, "we're giving each winner a full-page situation-wanted display ad, complete with endorsement."

Alcoa also aids the schools themselves by providing complete reference libraries for their design departments, by sending Alcoa design men to lecture at schools, and by donating metal for school projects.

## Skeeter Cops Honors

As for the winning designs, a Product Design graduate student at Illinois Institute of Technology won his school's contest with a "minimum transportation vehicle" resembling a scooter. The student is Louis R. Richards, and he calls his invention the Skeeter (see cut).

Skeeter consists of an 18-inch aluminum platform and upright handle. It is powered by a 1.32 h.p. model aircraft engine mounted in front, and rides on figure roller skate trucks. It weighs only 12 pounds and collapses to fit into a case measuring 6¾ by 9½ by 29 inches.

■ ***Skeeting along is Louis Richards whose Skeeter won him top honors at Illinois Institute of Technology. Handle, platform and engine enclosure of minimum transportation vehicle are of aluminum. Designer says that if unit is mass produced, fin, front truck, reduction mountings, battery receptacle, fuel tank and engine block would be a one-piece aluminum die-casting.***

The engine has ball bearing mains to withstand the thrust of a chain drive. Richards designed a special carburetor and muffler to reduce the 17,000 rpm to an adjustable 6000 to 8000 rpm range. The engine is geared to the front wheel and can provide speeds from 3 to 12 mph.

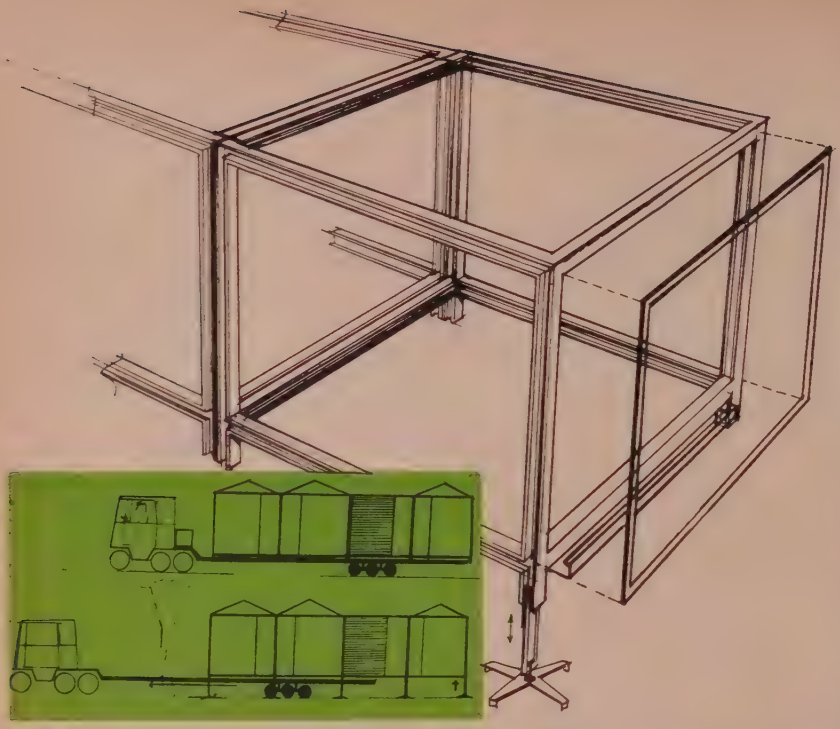
## Could be Die Casting

The inventor thinks that if Skeeter was put in mass production, the fin, front truck, reduction mountings, battery receptacle, fuel tank and engine block could be a one-piece aluminum die casting.

The rider steers the vehicle by leaning in the direction he wishes to go. The figure roller skate trucks make this type of steering possible by offering maximum cornering stability with minimum vehicle width. Front and rear wheels turn equally.

Skeeter has two controls, a thumb throttle and an ignition contact button, mounted on the handle. To start, the rider presses the ignition button and pushes off with one foot. To stop, throttle is released and as Skeeter slows, the rider steps off.

Richards sees many application possibilities for Skeeter. Industry can use it for messengers, managers who must tour large plants and night watchmen. Policemen and mailmen could also use Skeeter. Pedestrians could use it to travel short distances in crowded areas (Richards thinks Skeeter could trans-



■ *Diagrammed above are components of William E. Stumpf's modular home which won him contest at University of Illinois. Frame of 10-foot square modules is of aluminum extrusions, walls are made of Alply sandwich panels. Drawing shows how modules are connected, and how jacks are attached. Homes are transported by truck, also designed by Stumpf. Flat-bed unit is backed under standing home; jacks are then lowered until modules rest on truck, which takes home to new site. Jacks are then re-positioned, and truck is driven away.*

port six times as many people in the same amount of time as shuttle buses and taxis).

## Modular Homes Really Mobile

William E. Stumpf topped all University of Illinois entrants with his mobile-home modules using Alply sandwich panels. Each module is a 10-foot square room 8-feet high. Modules can be joined to one another or stacked.

Units could rest on stilt-like jacks which adjust for variations in topography. Heating and cooling systems and electrical outlets would be built into wall panels.

A Stumpf home would consist of a module for the kitchen, one for bathroom facilities and power plant, and others for living and sleeping quarters. Interiors could combine aluminum with wood, formica, mosaic tile, etc., for decorative effect, while exteriors are painted, anodized or hardcoated.

Stumpf also designed a low flat-bed truck for transporting modules. Entire units would be placed on the trailer and driven to site. House supports would be put in position, raised and the truck driven away. Manufacturer would own the trucks and provide a moving service for module-home owners.

Pratt Institute students were called upon to develop "something new and needed made of aluminum." Samuel Lebowitz met the challenge with an egg storage and dispensing system. This is a continuous strip of aluminum with pouches containing shell-less eggs that need no refrigeration. It is designed for use by mass feeding operations.

The system consists of two ribbons of foil with formed pockets sealed on three sides. Eggs are loaded through the fourth side, the final seal made, and sprocket holes punched. When all loading is complete, a length of foil is left which eventually becomes the package label. The ribbon is then placed in a corrugated aluminum-foil container, the label wrapped around the outside, and beaded shut.

For use, the container is vertically placed in a dispenser made of an aluminum extrusion (see cut). When all contents have been used, container is discarded.

## Tubular Roof is Portable

Herbrick Van Reisgen of the Philadelphia Museum of Art was a contest winner for his design of a movable roof for warehouse areas, fair grounds, etc. Roof is made of tubular aluminum connected by specially designed universal joints, couplers and spikes. Structure consists of modules which are folded for transportation. Roof can be expanded or contracted on all sides, and covered or left uncovered.

Arthur Goodbread was the winner from Syracuse University. Faculty members felt his entry satisfied Alcoa's requirement "to invent a simple machine that would give you a gumball, provide entertainment, and operate for a penny." Goodbread's design has an umbrella top that opens, a spinning turkey-feather wheel and gumball depositing chute.

## Alcoa Goes After Designer

Why is Alcoa trying to sell designers on aluminum? Because it believes that "industrial designers are increasing their influence every day, right to the point of specifying a particular company's raw material."

In conjunction with its school program, Alcoa recently gave each of the five schools which participated in the competitions, plus the University of Bridgeport, $1000 grants for use by their design departments.

In conjunction with its program to reach professionals (Alcoa conducts a similar competition for them. See MM, December, p. 30), the firm has started publication of a new magazine. The semi-annual hard-bound book, *Design Forecast*, has two objectives:

"To provide information to the designer about aluminum; to assist in defining and clarifying the designer's relationship with his corporate clients, and the corporation's relationship with its design counsel."

■ *Samuel Lebowitz of Pratt Institute is shown with his aluminum foil "ribbon of eggs" and aluminum dispenser. Pouches formed in double-foil ribbon hold shell-less eggs. After loading, length of foil is left which is wrapped around container, becoming package label. For use, corrugated container is vertically placed in dispenser, which allows one egg to be extracted at a time.*

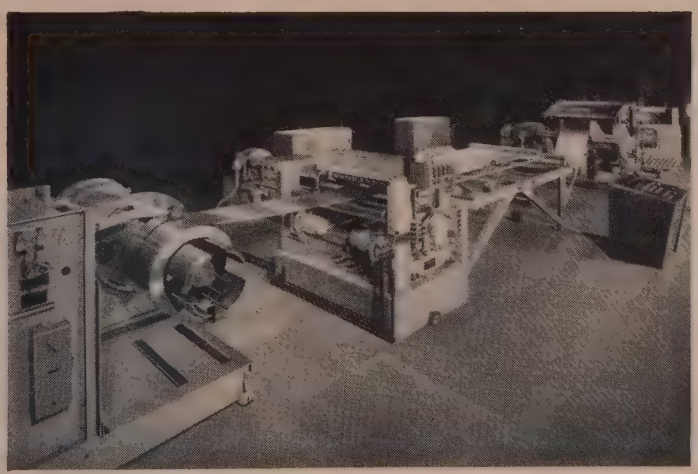
# ARE YOU ON THIS MAP?

## AND USING ALUMINUM COILED SHEET?

**WHY NOT GET PERSONALIZED SERVICE FROM PEOPLE WHO REALLY APPRECIATE YOUR BUSINESS...**

# SHEET ALUMINUM CORPORATION

### ONE OF AMERICA'S OLDEST AND MOST EXPERIENCED CUSTOM ROLLERS



Overall view of new Voss "coil leveling line" for production of siding quality aluminum up to 48″ wide. Modern equipment such as this means better quality aluminum from Sheet Aluminum Corporation.

It's hard to beat the combination of personalized attention from a small, experienced company that possesses some of the biggest and best equipment in the industry. You get top quality aluminum and you'll always be certain that your specifications will be met.

Sheet Aluminum Corporation operates a modern 4-Hi rolling mill . . . a new 48″ Voss Leveler and matching units to custom roll aluminum to any thickness from .006″ to .102″ in coil or sheet . . . widths from ⅜″ to 48″. A wide range of alloys include 1100, 3003, 5005, 5050, 5052, 5357 and 5457.

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# LAKE ERIE HYDRAULIC PRESSES

## where engineering makes the difference

**LAKE ERIE MAKES GOOD**

*Lake Erie has recently built some of the world's largest and most highly engineered presses*

- **Pictured at right—a self-contained 2000 ton forging press for Allegheny Ludlum Steel Corporation.**
- **A 6500 ton briquetting press for Titanium Metals Corporation of America.**
- **A vertical copper extrusion press—said to be the world's largest —for Scovill Manufacturing Co. (2500 tons capacity).**
- **A 10,000 ton combination drawing and stretch forming press with a 24 foot x 9′ 3″ bed for McDonnell Aircraft Corporation.**

*Right now Lake Erie is building more of the world's largest and most highly engineered presses*

- **A unique 166 foot long 450 ton draw bench with 44 foot stroke —the largest known—for drawing pipe up to 20″ in diameter with 1″ wall thickness.**
- **A self-contained (oil operated) 4300 ton aluminum extrusion press for Reynolds Metals Company.**

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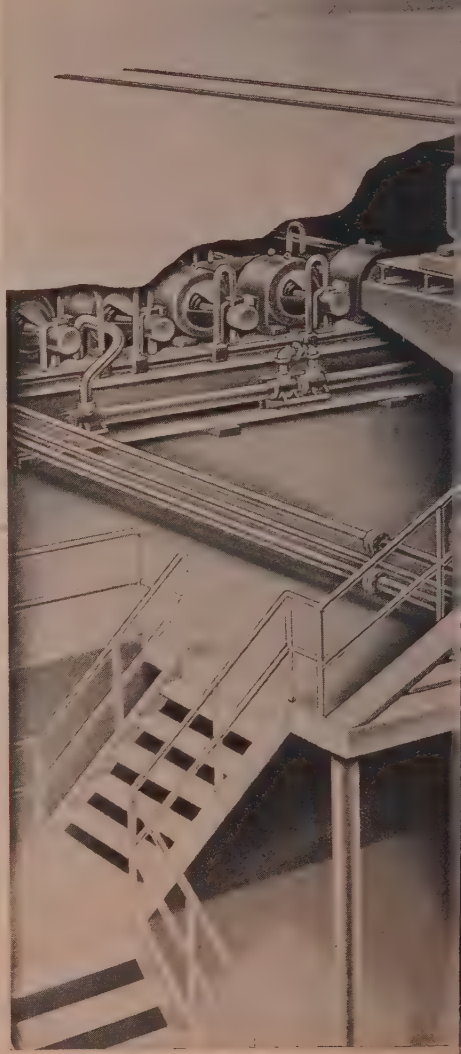
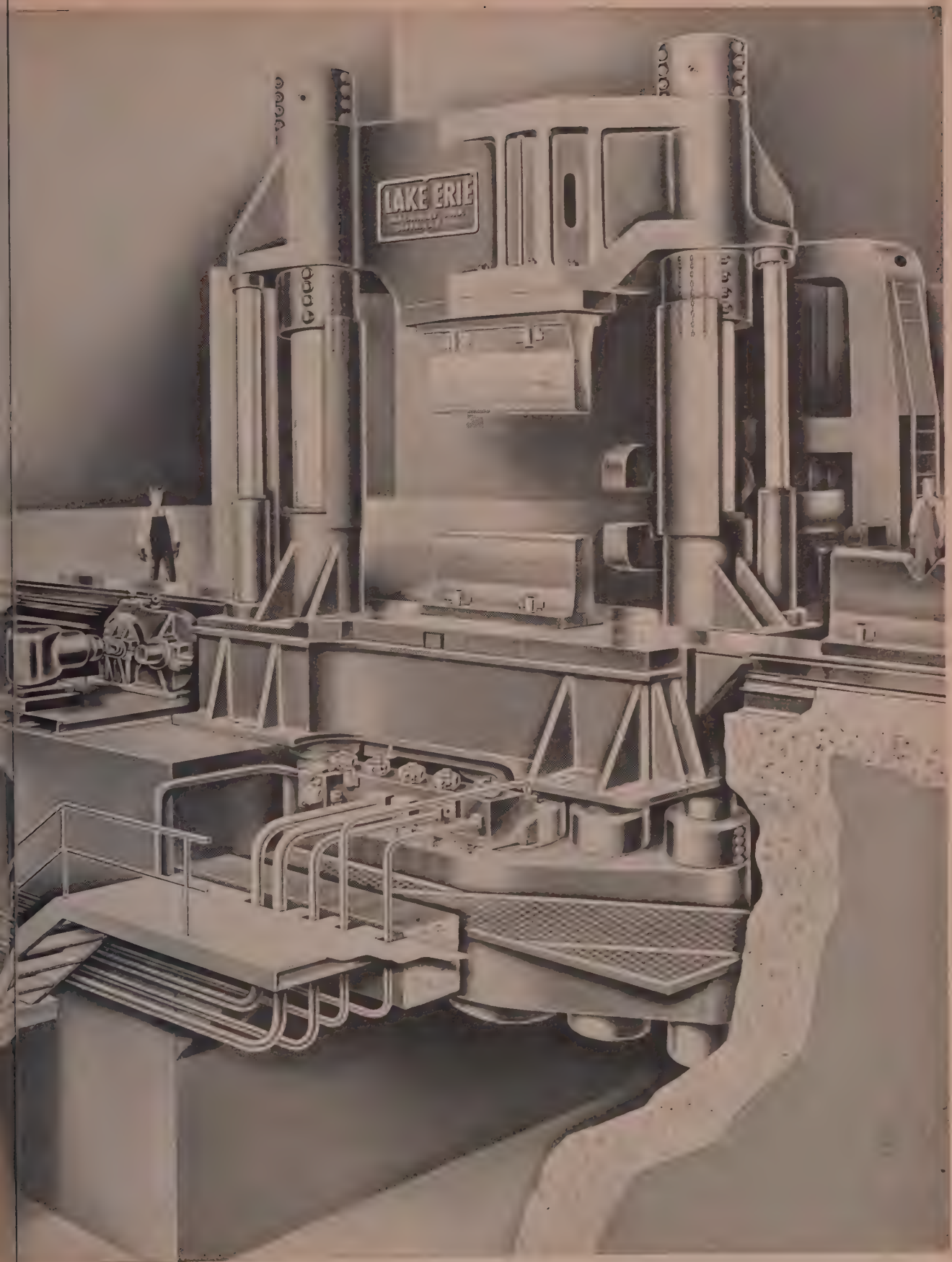
*new york*



**ARTIST CONCEPTION** of the unusual 2000 ton Allegheny Ludlum forging press which is currently operating three shifts a day. It is impossible to illustrate this press photographically because it extends through the floor.


LAKE ERIE

## aluminum extrusions make LIGHT, STRONG

# FALSE FLOORS

## for computer installations

ELECTRONIC computer installations have a way of messing up an otherwise orderly room. Their long, heavy cables, seemingly innumerable wires, and even air and vacuum lines are unsightly and a hazard.

What's needed is ample space beneath the floor so that these vital service lines can be hidden from view. An impromptu "false floor" may provide the necessary space, but what do you do when service lines have to be repaired, replaced or shifted? Tear up the floor?

Not if you have Elaflor, an ingenious system manufactured by Liskey Aluminum, Inc., Glen Burnie, Md. As its name implies, Elaflor is an elevated flooring system that you install over the regular floor. Made largely of aluminum extrusions, it is both light in weight and strong. It provides ample space between floor surfaces (see cut), and its removable panel construction gives access to service lines at any point.

The completed floor is capable of holding a safe uniform load of 250 pounds per square foot, or a 1000-pound concentrated load. It adds only about 6 pounds per square foot dead load to the existing floor.

Floor components include extruded aluminum stringers, tongue-and-groove I-beam panels, end bars and boundary trim. Lateral braces are either aluminum angles or steel tubing. All extrusions are of alloy 6063-T6. Base plates, pedestals and caps are of steel.

To install Elaflor, the base plates, pedestals and caps are first anchored at preplanned points. Stringers are then attached to caps using formed steel clamps and cadmium plated steel bolts, nuts and washers. Adjacent stringers are then connected with braces to provide lateral stiffening.

When the main platform is set, the entire floor is leveled by raising and lowering caps on the threaded pedestals. Finally, tiled panels are put in place. Each weighs 5 pounds per square foot, measures 2 by 2 feet, and is fabricated of extruded aluminum tongue-and-groove planks 6 inches wide.

Prior to installation, the contractor is furnished with shop drawings showing general arrangement of area. This enables cutouts for cable runs to be prefabricated. If air conditioning is involved, the placement of air openings is pre-planned. Cutouts are trimmed with extruded aluminum angles.

Extruded aluminum grating made by Liskey is used for air openings. Extrusions measuring six inches wide by two feet long are fabricated into modular panels for the flooring applications.

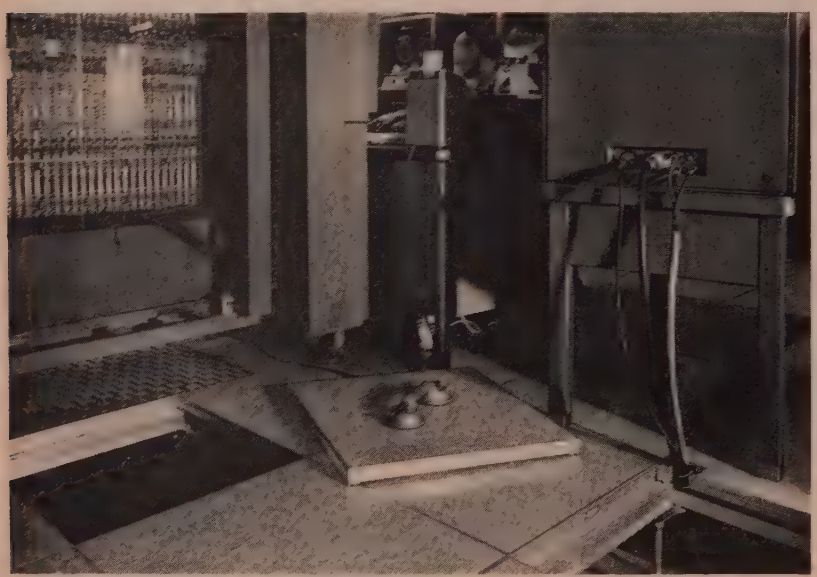
After the entire floor has been completed, ramps are placed where needed for movement of equipment to and from the elevated area.

Another use of aluminum in floor installations is in wide diameter caster pads which protect the tile surface. This accessory item is produced by the shell molding process from Tenzaloy. Pads are 5¾ inches in diameter with a 2½-inch diameter cup to hold casters.

The fire-resistant elevated floor requires little maintenance. Its standardized design of interchangeable modules makes it flexible so computer area can be enlarged, reduced or altered. With a special suction-cup device one man can remove any floor panel for access to hidden components.

To date, Liskey has sold over 200,000 square feet of pedestal panel flooring, and estimates that over 1,000,000 square feet of raised flooring have been installed in computer facilities.

The firm says any building contractor can install Elaflor, or Liskey itself will supervise or do erection.



■ *Floor panel has been removed with suction-cup device. Note how cables go through floor at right. Also shown are aluminum-grating air opening at left and caster pad holding equipment in center.*

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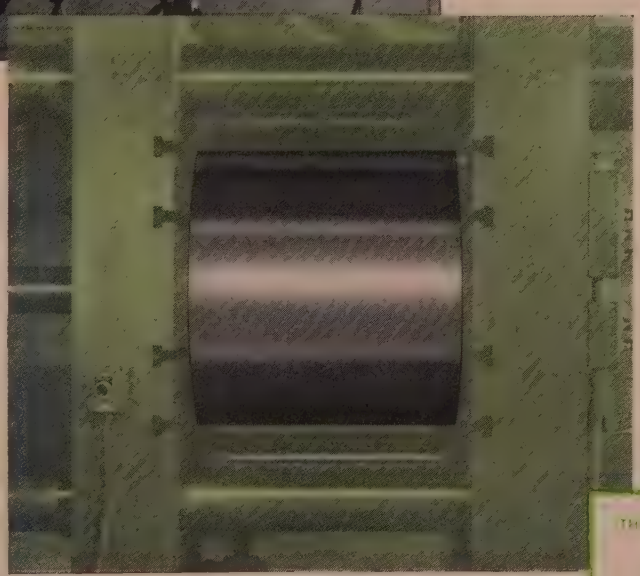

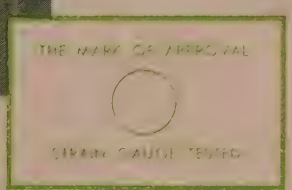


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| 6061 | Flat Sheet: O, F, T4 & T6 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |
| ALCLAD 6061 | Flat Sheet: O, F, T4 & T6 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |
| 2024 | Flat Sheet: O, F, T3, T36 & T86 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |
| ALCLAD 2024 | Flat Sheet: O, F, T3, T36 & T86 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |
| 7075 | Flat Sheet: O, F & T6 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |
| ALCLAD 7075 | Flat Sheet: O, F & T6 | 3" to 60" | 24" to 288" depending on thickness |
| | Coiled Sheet: O & F | 1" to 60" | |

*Alclad 6061 not available in thicknesses less than .032
**Minimum width in "O" temper—6 inches

Other heat treatable alloys available, subject to special inquiry.

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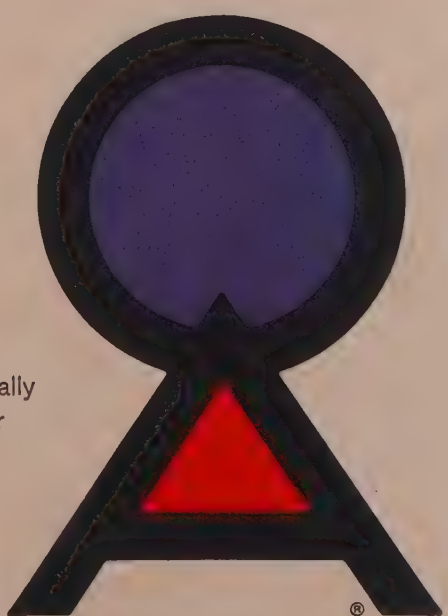

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# HOW UNIT DIES slashed downtime on G.E.'s casting machines

**Downtime of two hours or more did much to discourage multi-part die casting of fairly short runs. But the unit die principle cuts downtime to 15 or 20 minutes; makes short runs feasible.**

■ *Curved flange part of luminaire, one of 55 components die cast for G.E.'s outdoor lighting lines.*

*By John H. Mills, Process Engineer, Outdoor Lighting Department, General Electric Co., Hendersonville, N.C.*

THE OUTDOOR Lighting Department of General Electric operates four aluminum die casting machines to produce the 55 different lighting equipment components required for our three basic lines — mercury, fluorescent and filament outdoor lighting fixtures.

We are naturally interested in reducing, as much as possible, the costs involved in original tooling, downtime or changeover time, as well as the actual production time for the finished part.

### Example: Ballast Base

Using the standard unit-die technique pioneered by Detroit Mold Engineering, Detroit, Mich., we have shown considerable savings in these areas.

Let us take, for example, one of the parts made in the die casting shop — the small ballast base used in the new Type-M mercury street lighting luminaire. Including external ribs, the base measures about 6 x 6 x 1 inches and weighs about eight ounces.

### 100 Shots Per Hour

The standard unit die installed in a 500-ton machine provides 67 square inches of maximum cavity area per side, with a total of 134 square inches for the entire unit. The ballast base is presently coming off the unit die assembly at about 100 shots per hour — one ballast base and one or two other parts per shot.

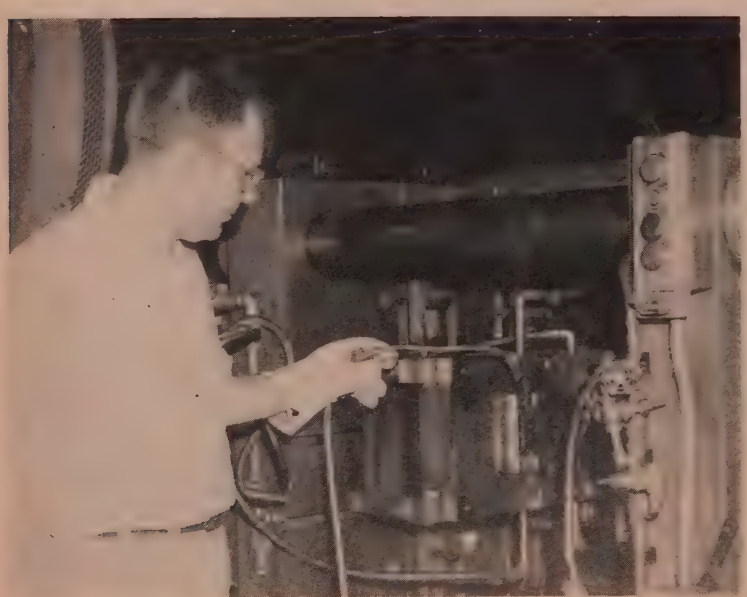
In the near future we expect to increase production on this base to about 135 shots per hour.

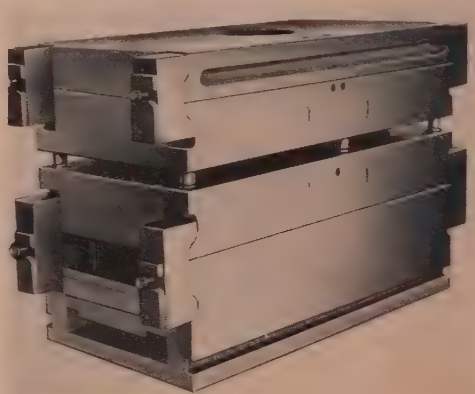
Our biggest savings, however, come not so much from higher production rates as from reduction of downtime during changeover.

We have 14 of the replacement units in the die casting shop, and each of these can be set up in about 20 minutes — quite a difference from the 2½ hours usually required for a conventional setup. This short setup time gives us an unusual degree of flexibility in die casting practice, making short production runs easy and economically feasible.

### Saving: $2000 Per Mold

Add to this the reduced cost of tooling which presently saves about $2000 for each mold and we are maintaining production rates while our tooling cost is going down. In the first year





■ *Unit die in use at G.E.'s Outdoor Lighting Division. Left-hand photo shows unit die in open position, exposing one replacement unit which produces parts for luminaire. Machine is a Cast-master model 20A. Above, standard unit die assembly showing two replacement units installed, and quick-change wedge clamps for changing units while die is in the machine.*

## FOR DIE CASTING

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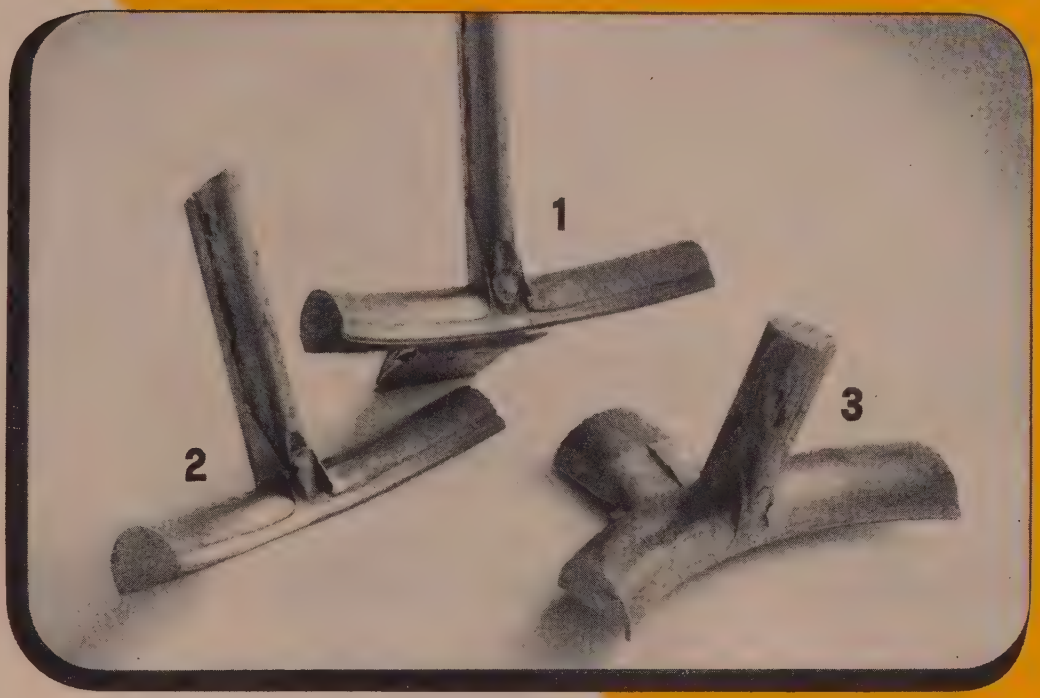
# NO WELD IS CHEAP **




*NO WELD, a remarkable mold release, has defied duplication since it was developed 12 years ago to protect dies and ease the release of die castings. It was used to "shoot "out" the "weld" that caused flaws in the No. 13 aluminum alloy castings above.

**was "welded" to the core. When it was removed, the "welded" portion was torn from the casting and remained firmly attached to the core.**

**shows intermediate stage in "shooting out" the "weld." Die was run hot with liberal amounts of NO WELD, which partially penetrated the "weld" and acted as a flux so that fresh metal has picked up loosened part of the "weld."**

**the final stage, shows how NO WELD has completely penetrated the "weld" and the new casting has picked up the remaining slug of metal. The "weld" would not have occurred if the die caster had started the job with NO WELD.**

**NO WELD was developed to protect your costly dies. Even if it cost $100.00 per gallon it would be cheap if it protects your dies, improves casting quality, cuts down-time, and boosts your production.

**Write today for a free sample. Your investment of one 4-cent stamp will show you how high quality NO WELD can *lower your costs.***

# SCOTT CHEMICAL CORPORATION

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of operating with the unit die we estimate that we will save about $20,000 in out-of-pocket cost.

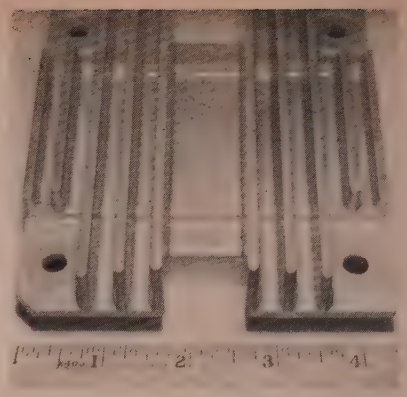
In die casting the ballast bases, like the other small parts we manufacture, we use conventional ladling methods. The as-cast weight of the twin-shot aluminum casting is between 1 and 1½ pounds, and we have noted that the final product is comparable in every way to previous techniques in part uniformity, dimensional tolerances, and external finish.

### Standard Unit Die Is . . .

A brief description of the standard unit die itself may be of some interest. Our present unit die takes two 10 x 12-inch replacement units and is of sufficient capacity for most of our small part production requirements. The overall dimensions of the unit holder are 12 x 25-inches, and there are provisions for multiple-cavity casting which we are not yet fully utilizing at the present time.

Because of the success of the 10 x 12-inch unit die, we have obtained for immediate installation a larger D-M-E standard unit die to be used in a 600-ton machine.

This larger model accepts two 12 x 15-inch replacement units, and measures 15 x 30-inches overall with a maximum cavity area of 110 square inches per side and a total of 220 square inches per unit. Both sizes have center sections of H-13 type steel and the replacment units are D-M-E No. 2, heat-treated to 300 BHN.



■ ***A ballast base for G.E.'s luminaire, cast in aluminum on standard unit die. The unit die principle makes drastic cuts in die casting downtime.***

### Mighty Flexible

The standard unit die permits complete freedom in installing cooling lines or cores on three sides of the cavity. Cooling is provided in the unit for the center section. Core slides and other movable components can be easily mounted on three sides of the cavity. Included in our unit die is a complete ejection system, with replaceable ejector plates for each replacement unit.

To recapitulate, our production rates and high quality standards tie in directly with the great variety of different parts necessary for a complete line of outdoor lighting equipment. The presence of these three factors made it mandatory for us to minimize wasteful downtime involved in multiple changeovers.

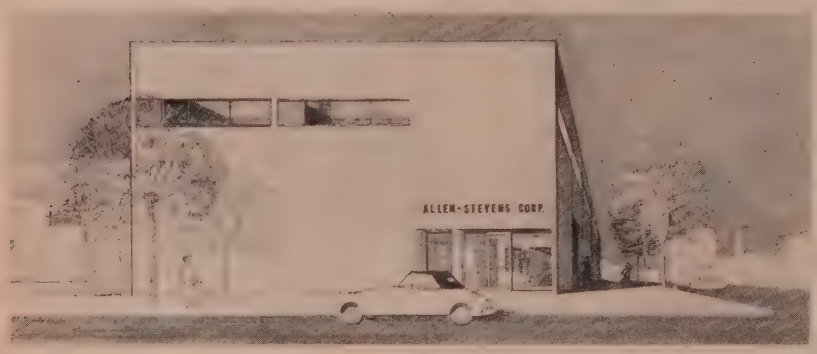
So far we have kept or improved our present rate of production, cut our machine downtime, and made is possible to utilize our shop capacity more fully without massive and tedious production difficulties. Changeover, in particular, has always been a major problem in short-run die casting, and it looks as though we are on the way toward winning an old battle.

In less than a year's experience with the D-M-E standard unit die technique, the results achieved have far exceeded our expectations.

### Only the Beginning

However, we have just scratched the surface. At present, we are experimenting with other applications which we hope will equal or even surpass our results to date.

Just what the ultimate savings in cost and improvement in product might be is hard to estimate, but to make better products at less cost to the consumer, we intend to explore every avenue.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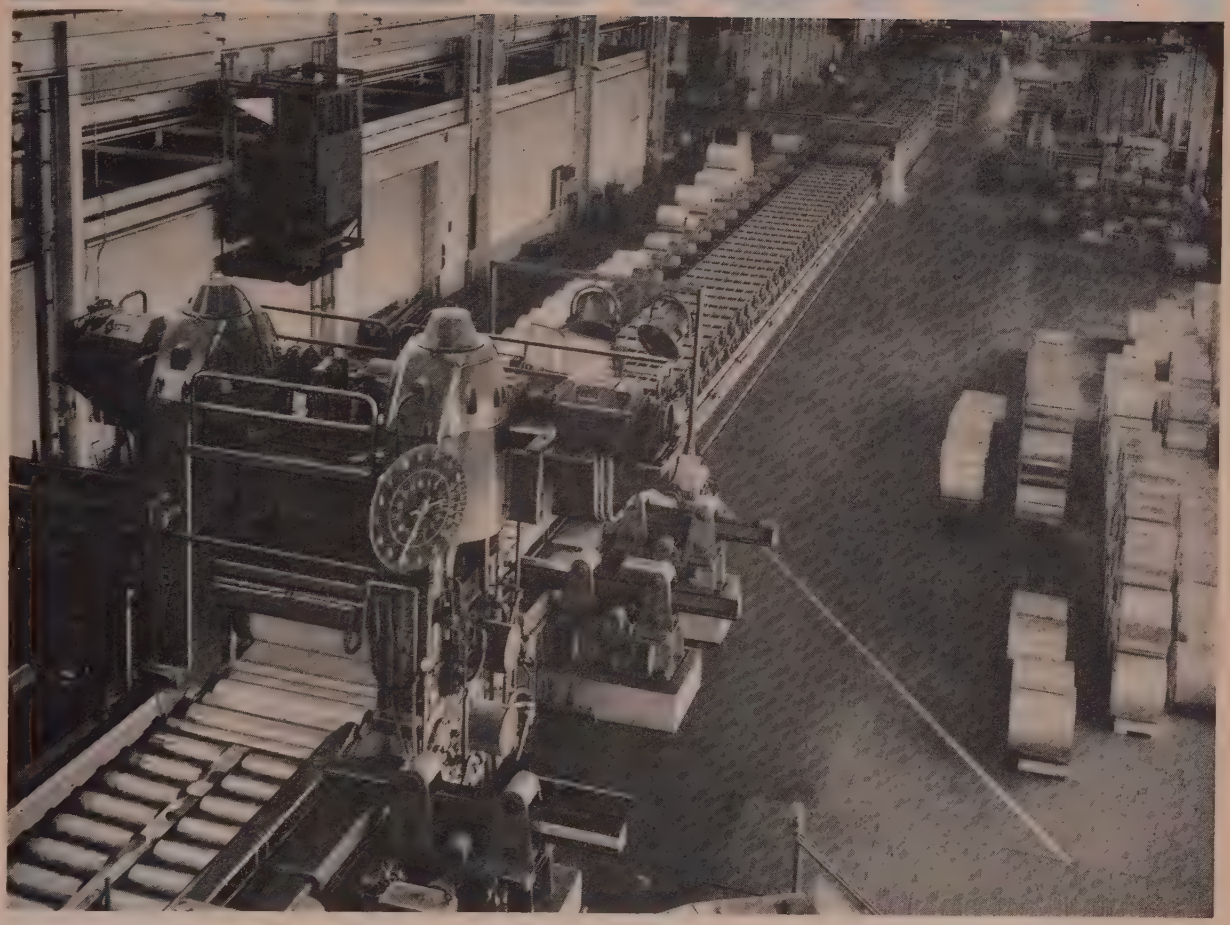
# PRECISION



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# RUGGED MAGNESIUM CASE

## *protects airborne tape recorder*

• Test flight data is vital in aircraft and space vehicle research. Rigidity of lightweight cast magnesium helps keep highly sensitive tape recorders "on the beam."

by ROGER E. HOLMES
Consolidated Electrodynamics Corp.
Pasadena, Calif.

■ *Cast magnesium case and cover of magnetic tape recorder give needed rigidity for high altitude instrument performance.*

RECORDING and data processing instruments in the field of space research often represent a sort of treadmill for the scientists and technicians who design this type of extremely complex electronic equipment.

The amount of data recorded and processed by these instruments, and the great accuracy of their performance, enable engineers to improve the performance of rockets and planes. As they reach ever greater altitudes and speeds, they open new areas to testing.

At the same time, however, environmental conditions become more gruelling for these highly sensitive instruments. The amount of available space dwindles as more equipment is stowed aboard, while the operating range and need for accuracy increase.

A new point has been scored against this dilemma by Consolidated Electrodynamics Corp., manufacturer of data handling instrumentation equipment. Consolidated uses rigid, lightweight magnesium in the case of its Type 5-702 Magnetic-Tape Recorder for airborne and mobile applications.

This recorder, which measures only 12⅞ x 25 x 7 inches, can operate accurately at up to 70,000 feet and in temperatures from −55° to +71° C. But it offers technicians most of the recording features available on the ground.

■ *Use of magnesium in compact tape recorder of Consolidated Electrodynamics Corp. pared 9¼ pounds off comparable size in aluminum. Each unit gets corrosion and chip resistant baked enamel finish. Cast construction in strong magnesium alloy gives rigidity needed to protect delicate electronic parts under severe service conditions.*

### Shock; Heat; Cold

In service, such instruments are subjected to a variety of unusual forces, such as shock, sudden acceleration, severe heat and cold. These cannot be allowed to disturb the recordings.

To illustrate how precise these recordings are, CEC mounts the magnetic head stacks and tape-drive components of the recorder on an optically flat precision plate. Data gathered during test flights are recorded on 14 tracks along the length of a one-inch-wide tape (or seven tracks along a one-half-inch-wide

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tape). Track width is .05-inch and the distance from center to center is only .07-inch.

The slightest misalignment of the tape due to bending or twisting of the case can ruin the recording by causing the tracks to overlap. The rigidity of the magnesium case prevents this.

### How It's Finished

To protect accuracy and at the same time keep weight to a minimum, CEC decided on a case wall thickness of .155 inch. Using magnesium instead of aluminum saves 9¼ pounds per unit. Both the case and its cover are sand cast in alloy AZ-91C in accordance with MIL-M4204 Type III, and finished with a baked coating of tri-polymer thermosetting resin in a spatter texture.

The painting is done by Product Techniques, Inc., Pasadena, using their own tri-polymer resin formulation. This coating has high resistance to chemicals, solvents and chipping, and has eliminated much time-consuming touch-up. While either hand or electrostatic spraying can be the coating method, depending on quantity runs, hand spraying is generally used.

First, cases and covers are put through a vapor degreaser; then, one smooth coat of PT 201 is applied, followed by a baking treatment at 325° F. for 30 minutes.

■ ***Assembling compact tape recorders at Consolidated Electrodynamics. Company is leader in development and manufacture of dynamics recording and analytical control equipment.***

This coating is applied without a primer and is approximately .001 inch thick per coat. After this, a spatter coat is applied, followed by baking at 325°F. for one hour.

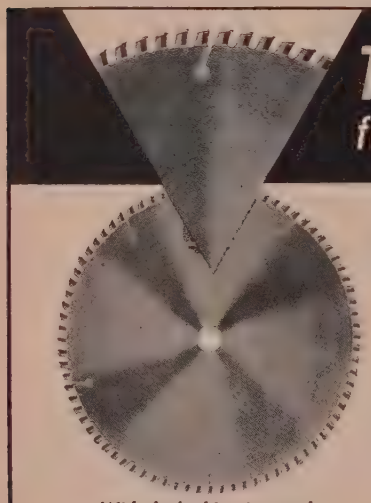
### In Other Equipment, Too

The company uses light metals extensively in its products, such as aluminum cases for other data-recording equipment, chassis panels, airborne amplifiers and power supplies. Its use of magnesium was previously limited to small rollers, arms and roller supports used in tape guides in the airborne recorder and tape storage arms on digital magnetic tape recording devices.

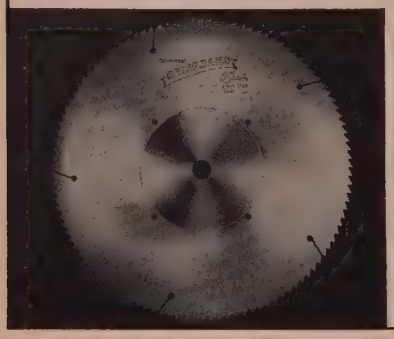
Consolidated Electrodynamics Corp. is one of the world's principal developers and suppliers of precision electronic instrumentation. Since it was established in 1937 CEC has been identified with the development of new techniques and electronic tools with which industry and science measure and, in part, control the dynamic boundaries of Man's physical environment.

Its experience and skill earned it a position of leadership in the new areas of technology born of advanced aircraft and missile needs, as well as requirements for nuclear reactors and automatic petrochemical plants.

The corporation operates six divisions in Southern California and one in Rochester, N. Y.

*With locked-in tips and vibration dampeners.*



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We've called the stack of pig a "mountain" because that's the impression we always get when we walk among such stacks at any of Alcoa's many producing locations, where "mountains" like this are constantly being built and torn down again for shipment. And, as "Pres" will tell you, Alcoa, the world's largest producer of primary aluminum, has more smelting facilities under construction than any other basic producer.

A 25-year veteran with Alcoa, Pres knows his company shares his faith in the market for primary aluminum and is keeping pace with the requirements of an expanding economy.

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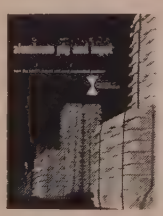

This new 12-page booklet lists all grades and alloys available in pig, ingot and billet form, together with their composition and properties. It also describes the services and technical assistance available from Alcoa's metallurgical staff, the most experienced and unbiased in the industry. Write today: Aluminum Company of America, 2119-B Alcoa Building, Pittsburgh 19, Pa.

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ALCOA ALUMINUM

# ALUMINUM ROOFING *in England*

by M. Bridgewater, Sales Development Manager, Northern Aluminium Co., Ltd., and H. C. Dunn, Development Dept., British Aluminium Co. Ltd.

**Aluminum got off to a slow start in Britain's roofing business, but has made rapid progress since the war. The British approach to this tonnage market is detailed in this paper, from an Aluminium in Building symposium sponsored by the Aluminium Development Association.**

ALUMINUM roofing dates back to the earliest days of the industry. A Roman church was clad in the light metal in 1897 and a Swiss home was roofed with it the following year. Recent examination has shown that both installations are in good condition after more than 60 years.

Other roofing applications have popped up through the decades, but it was not until 1946 that aluminum made significant advances as a roofing material in the United Kingdom. Two early installations, both in 1946, are believed to be the first examples of aluminum roofing in Great Britain, apart from certain small amounts in the factories of aluminum producers.

## Two Early Examples

The first consisted of a few panels of "Italian tile" patterned sheet, fixed on one end of a waterfront warehouse. The rest of the roof was covered with similar tile in a different metal. The aluminum portion was recently inspected and, apart from a thick coating of grime, appeared almost unaffected by its 12 years' exposure in this fairly destructive atmosphere.

The second example was the roof of a large clothing factory with tiles pressed from surplus 3003 alloy sheet. Recent inspection showed the tiles in perfect condition and they give every indication of very long future life.

Aluminum roofing has developed into several distinct types with the advantages of the light metal common to them all. Therefore, the properties of aluminum that aid its performance as a cladding material should be discussed. Only two materials are now used for roofing applications—3003 for most self-supporting cladding; and various grades of pure aluminum from 1100 alloy up to super-purity as well as a certain amount of alloy 3003, for all fully supported roofing. Except for strength, their characteristics are similar, so the term "aluminum" refers to them all.

Successful cladding should keep out the weather indefinitely with complete safety at the least possible cost. To analyze the performance of a material the following should be considered:

1. Durability; 2. thermal insulation; 3. strength; 4. fire resistance; 5. price.

In laboratory tests, aluminum shows excellent resistance to external exposure, due to an inert oxide surface film which re-forms spontaneously in air when the surface is damaged. Under corrosive conditions this oxide film can break down locally, but it reforms to a greater thickness and stifles further attack. Aluminum has extremely good resistance to marine atmospheres and to sulphurous fumes, the main cause of corrosion in industrial environments.

Durability, however, cannot be measured in absolute terms. It is important to establish how a relatively new material compares with those whose performance has been tested through practical experience. In all cases, including marine and industrial localities, aluminum compares favorably with copper and zinc.

The final durability test must be practical experience based upon wide usage. Since 1946, about 100 million square feet of aluminum cladding have been erected in the U. K., mostly in corrosive localities. Except for a few isolated cases where exceptional conditions or bad practice caused trouble, all this roofing is performing well.

As a result of many successful applications, aluminum is being increasingly specified for use in heavy industrial and marine areas and for gas, steel works and power stations, where corrosion is always a serious problem.

## For Good Thermal Insulation . . .

The necessity for good insulation is now accepted, and cladding materials with good insulating properties are commanding a premium since their increased costs are recovered in reduced heating costs.

Most of the heat loss from buildings results from radiation through air spaces. Since aluminum reflects a high proportion of radiant heat it is an excellent insulator. Because its insulating qualities depend upon the reflection of radiant heat, best results are obtained when it is installed with an air gap on one or preferably both sides. Therefore, aluminum is particularly suited for use with other insulating materials for com-

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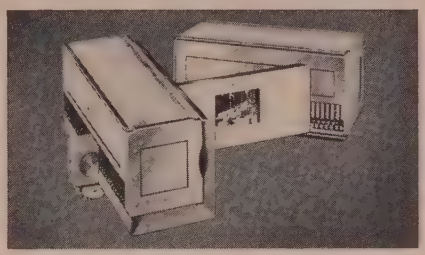

Airequipt slide changer comes complete with adapter and one magazine for 36 slides.

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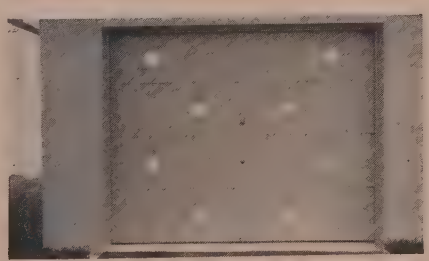

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The stucco aluminum finish on both sides is practical and attractive. The door won't warp, sag or rust—never needs painting, although it may be painted if desired. The honeycomb core offers insulating properties that save money on heat loss.

Other advantages gained through aluminum: weatherproof, resists moisture and decay; vermin resistant; fire retarding.

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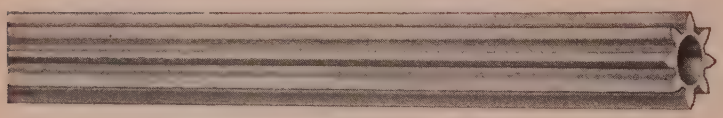

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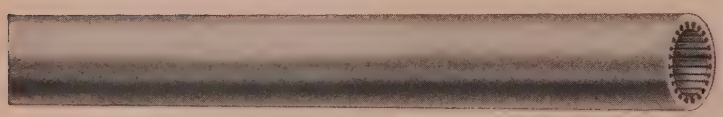

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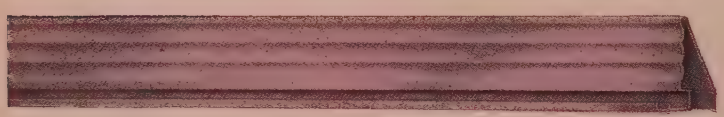

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posite walls with high insulation.

With increased thermal insulation, condensation becomes a problem. It is caused by warm humid air coming into contact with a surface, usually the outside skin, that is at a temperature below the dew point. Some condensation occurs in all buildings but it should cause no trouble if precautions are taken.

The most effective cure is a continuous impervious vapor barrier, such as foil or a suitable paint, on the warm side of the insulation. This prevents humid air from penetrating to the cooler air spaces on the insulation or condensing on the vapor barrier.

If this is impractical, the air gap between the skin and insulation should be well ventilated. In very humid conditions, moist air should be prevented from coming into contact with the outside skin by providing some form of "over purlin" lining.

### Strength; Fire Resistance

Cladding must be strong enough to withstand the loads encountered during a normal service. Owing to deterioration from exposure, the strength of a roof can sometimes fall to a dangerous level well below the specified limit. Because of their durability, however, aluminum roofs rarely suffer from this.

One important point to consider is that the highest loads on roofs are from wind suction. Because of the very low weight of an aluminum roof, supporting structures must be capable of withstanding these suction loads.

It is obviously desirable that all buildings have maximum fire resistance. But because of the temperatures developed (800°C is reached in 20 minutes) all cladding materials sustain severe damage, if not complete destruction, in a major fire. It is important, however, that the cladding material neither assist in the spread of fire nor constitute a hazard to personnel.

Aluminum will not support combustion, and in no circumstances assists in the spread of fire. Its low melting point, 657°C, means that in a serious fire it will probably melt locally. This results in the release of hot gases and fumes which in certain cases can tend to localize the fire at an early stage.

The detailed economic case for each form of aluminum cladding varies with each building. Although the prices of most materials have risen greatly since the war, the increases have been broadly in the same ratio. We have, therefore, in descending order of cost:

1. Reinforced plastic sheet
2. (a) Protected steel
   (b) Aluminum
3. Galvanized steel
4. Asbestos cement sheet

(*Continued on page 72*)

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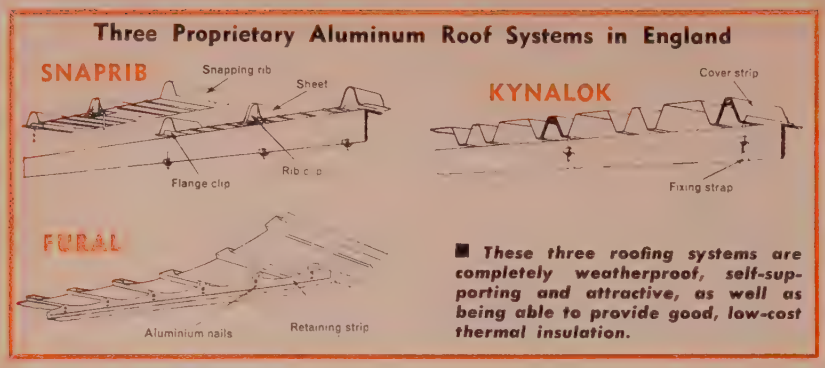


■ ***These three roofing systems are completely weatherproof, self-supporting and attractive, as well as being able to provide good, low-cost thermal insulation.***

This is only a general guide, and is based upon thicknesses suitable for industrial construction. This qualification is important since thinner gauges of aluminum are used successfully and economically in competition with the cheapest roofing materials on specialized farm buildings, where good thermal insulation is particularly valuable.

In assessing costs, it is important to make full allowances for operating and maintenance charges as well as initial installation. When allowances are made for the maintenance-free life and reduced heating costs, aluminum is generally found to be economical for most types of cladding.

## Two Basic Forms of Cladding

As architects learned more about corrugated sheet and determined the economies of aluminum as a cladding material, they became anxious to extend its application to other forms of roofing. This has resulted in the rapid development of several distinct forms of aluminum cladding, each with a well-established use.

Development has been along two major lines: Systems that have to be self-supporting to enable them to span between purlins; and those that are fully supported. The main types of aluminum cladding can be summarized as follows:

Self-supporting
- (1) corrugated sheet
- (2) proprietary concealed-fixing systems
- (3) decking

Fully supported
- (1) flat sheet fixed by traditional methods
- (2) tiles

Aluminum corrugated sheet was made in small quantities prior to 1939, but the early examples were mostly experimental. They were installed on the plants of aluminum producers for long-term test purposes. One such test installation still exists.

These existing sheets are exposed to a particularly aggressive atmosphere. When examined in 1958 they were coming to the end of their useful life after 25 years. They were in commercial purity aluminum, whereas the standard material is now alloy 3003. Although the service life of 25 years is good by any standard in this particular environment, even more use might have been obtained if direct contact with the supporting steelwork had been avoided. The ultimate breakdown was caused by galvanic action.

At the end of the war there was a tremendous demand for all types of building material, though most were scarce. Aluminum output was being vastly increased, but producers were facing drastic reduction in aircraft orders. This placed the industry in a good position to expand in the building field.

Corrugated sheet was an obvious outlet for sheet, but developments in this direction moved slowly. Such caution, however, was not bad since it allowed steady development along sound lines.

With an ever-increasing number of users becoming familiar with it, the demand for corrugated aluminum sheet has grown steadily. But the industry realized that although the conventional sinusoidal profile used for steel (the 8/3 inch and 10/3 inch sheet), was an obvious starting point, it was not best suited to aluminum's properties.

## New Profiles Developed

Ultimately, trough profiles were developed, giving a substantial depth of corrugation which allows the sheets to span wide purlin spacings while keeping the deflection under load within reasonable limits.

These troughed profiles are in demand not only because of their greater load-bearing efficiency, but because their bold profile is well suited to the cladding of buildings, such as electricity generating stations, which have large unbroken surfaces.

Improved manufacturing methods have made it possible to produce long, wide sheets. The results were a reduction in fixing time; fewer laps needed, which saved metal; and many points of possible leakage eliminated.

This emphasis on long sheets has not been carried to extremes, as in Switzerland, where sheets up to 75 feet long have been used on certain jobs. In the U. K., 35 feet has been generally accepted as the practical limit from the viewpoint of handling and transport.

Another consideration is that, unless special precautions are taken, expansion problems occur when sheets exceed 25 feet. Below this length, experience has shown that the flexibility of the sheets, fixings, and the structure itself is sufficient to accommodate expansion.

To avoid galvanic action fixing accessories, such as hook bolts and drive screws, for use with corrugated and troughed aluminum sheet should be in aluminum.

## Proprietary Systems in England

When postwar experience showed that aluminum was ideal for cladding material, architects became anxious to use it in many building applications. In particular, they were interested in its possibilities for shallow pitched roofs on low-cost housing projects, schools and other public buildings. However, it was not felt that corrugated sheet could fill the bill.

By the early 1950s it was obvious that there was a real demand for economical, architecturally designed aluminum cladding, and several proprietary systems were designed.

Although these vary considerably, all are designed to meet the same general requirements:

1. *Completely weatherproof.* To achieve this, the system must give a continuous metal cladding with concealed fixing.

2. *Self-supporting.* To be strong enough to span purlins, it is necessary to incorporate longitudinal strengthening corrugations into the sheet.

3. *Attractive appearance.* Although corrugations are essential to provide strength, they should give an architecturally attractive profile. No fixings should show, and all accessories must appear neat and finished.

4. *Good thermal insulation.* The system should be designed for simple installation, with conventional insulating materials to give a composite cladding with good thermal insulation.

5. *Economical.* A cladding with concealed fixing is more complex and expensive than conventional corrugated sheets. By simplifying the components and erection, the installed price must be competitive with alternatives.

Proven systems have been simplified so that any competent roofing contractor can install them. However, best results are obtained by erectors who have had some experience with the special fixing techniques.

(*Continued on page 74*)

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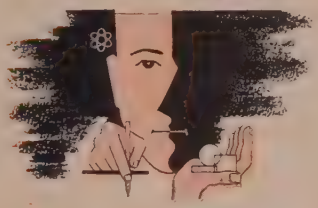

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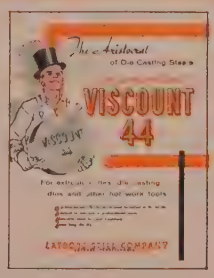


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■ *Workmen are installing troughed aluminum sheet which will form basis of deck roof. The sheet was designed to meet special load requirements of British Standard.*

Because of the savings in erection and heating costs, there is a trend toward the use of low pitched roofs on schools, hospitals and houses. Concealed fixing systems are designed to be weatherproof on low slopes, and architects have found them a convenient and economical solution for the low pitched roof.

Another important architectural use for concealed fixing systems has been for infill panels, spandrels and soffits of schools, blocks of flats and offices.

The economics of these systems depend largely on type of installation and degree and kind of insulation required. In assessing costs it is important to consider the structural unit as a whole, and to make full allowance for structural savings that can be achieved with these systems. In the case of a roof, for instance, allowance should be made for reduction in size and number of purlins and for structural saving resulting from the reduction in roof pitch.

## Deck Roofing Gaining Favor

Recently there has been a trend toward the use of attractive deck roofing which helps eliminate waste roof space. In addition to much wider usage for public buildings, the adoption of aluminum deck roofing is particularly noticeable in industrial buildings, of which about 20% are now being built with flat or low-pitched roofs.

Immediately after the war the advantages of aluminum for deck roofs were realized by William Briggs & Son Ltd., who offered the Bitumetal system. Now several firms offer similar systems, and over 30 million square feet have been erected on all types of buildings.

A typical aluminum deck roof consists of a prefabricated, troughed, aluminum deck unit spanning purlins, a layer of thick insulation board bonded with hot bitumen to the top surface of the deck, and a final weatherproofing cover of multi-layer flexible roofing, bonded with hot bitumen to the insulation board.

Normally these deck systems are capable of spanning between 3 feet and 10 feet depending upon the exact gauge and the type of profile used.

Deck roofs are normally installed by the firms marketing the system. Good workmanship, plus a new method of waterproofing, provides a completely leakproof, maintenance-free roof.

The reliability of deck roofing is one of the main reasons for its widespread adoption. The reflective aluminum surface, coupled with the method of construction, results in decking with very good thermal insulation. U values of 0.33 are obtained with ½ inch insulation board, and 0.13 with 2 inch cork board.

From the inside, the roof has a bright appearance with good light reflectivity. It also provides a corrosion resistant interior which lasts indefinitely without maintenance in normal factory conditions. The low weight of the decking — 4 to 8 pounds per square foot, depending upon the multi-layer flexible roofing — will often permit secondary savings in the supporting structure.

A recent development in aluminum deck roofing is a composite all-metal system built up from Snaprib sheet, made by Northern Aluminium Ltd., and troughed sheet, which can be used on 4° pitch roofs. The Snaprib sheet which has specially prepared ends to insure weathertight ridge and eaves, is used as a continuous external weatherproof cladding while the troughed sheet acts as an internal liner and load carrying member.

About 40-50% of the decking in the U. K. is aluminum and it has been installed on all types of public buildings and is also being specified for factories with corrosive internal atmospheres.

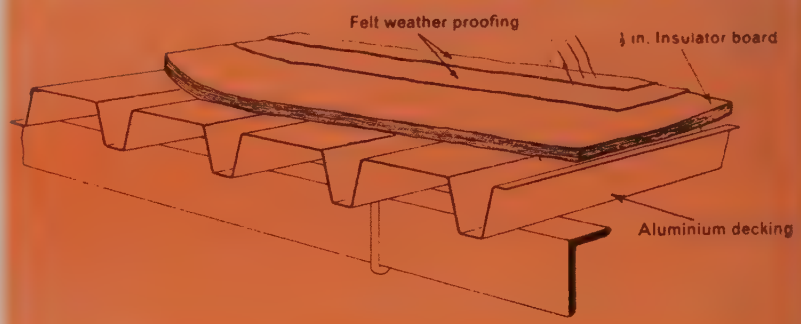
## For Fully Supported Roofing . . .

In Great Britain, the first important recorded use of aluminum for roof work is in the form of flashings at a Glasgow cooperage. These extensive flashings were applied to timber glazing in a slated roof. The cooperage deals mostly with the repair of whiskey barrels. Sawdust impregnated with whiskey accumulated in the roof crevices round the flashings and led to rapid attack on the original lead flashings.

In 1927 it was decided to try aluminum. All the lead was replaced by commercial purity (99%) aluminum, 0.040 inches thick.

In 1952 the flashings were renewed in super-purity aluminum (99.99%). Laboratory examination of the original aluminum flashings showed some attack on the edges, which had been set

**Construction of Typical Aluminum Deck Roof**




■ *Drawing of deck roof shows position of different elements as entire unit rests on angle purlin. Troughed sheet is bonded to thick insulation board which is coated with felt roofing.*

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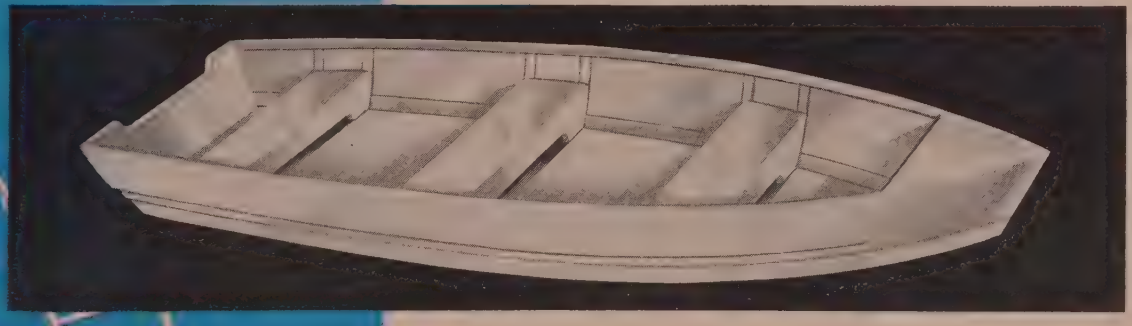

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■ *Transit sheds on the Liverpool docks have been roofed with aluminum alloy 3003 troughed sheet. Glistening sheets were dulled by the Alocrom process to reduce glare of sun's rays.*

in cement mortar without protection, but the main body of the flashing was still in serviceable condition.

[illegible] applications were special cases and it was not until after the war that [illegible] was taken in aluminum as a [illegible] supported roofing material. It was cheaper than either lead or copper —and even, for a time, than zinc. But aluminum was soon recognized on purely technical grounds, too. It was recently recommended to roof a church in London's East End, experts naming it the most suitable metal to withstand the particularly corrosive atmosphere.

## Materials and Practice

It is usually because of its mechanical properties that aluminum is preferred as a roof metal. Commercial purity aluminum and the higher purities up to 99.99% are the normal materials for this application. The higher the purity the greater the ease of working, a factor that outweighs the additional cost of higher purity metals.

Aluminum is not subject to creep and is therefore particularly suited to the covering of domes and steep slopes. It withstands a considerable degree of cold working, and roof workers find it easy to lay.

A large variety of buildings have been roofed using aluminum and the traditional "hard metal" technique. This is based primarily on fixing of the metal in small sheets, each sheet being free to expand and contract independently. Clips securing the metal to the understructure are folded into the joints between the sheets. The sheet size is usually 6 feet by 2 feet, although slightly greater lengths are used on sheltered roofs.

Seams for the ridge-to-eaves jointing of panels are of several types — batten roll, standing seam, and conical roll. The first two are preferred, but the standing seam is becoming most popular due to the elimination of timber. The essential characteristic of these joints is that they protrude from the roof, one of the objects being to guide rainwater to the eaves.

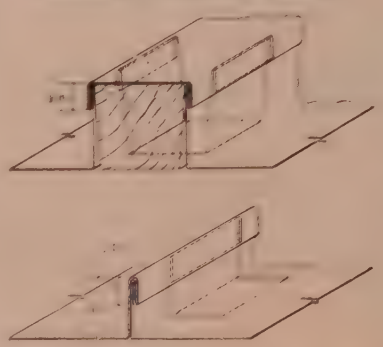
Transverse joints are made by using seams that do not obstruct the flow of water. Choice of seam depends upon slope of the roof, a drip being used where the pitch is below 10°. From 10° up to 45° the double lock cross welt is used, and from 45° slopes up to vertical sheathing, single lock cross welts are used.

A system developed in Switzerland uses the metal in long narrow panels. Sliding clips are incorporated in the standing seams to allow for the movement of panels under varying thermal conditions. By this method, roof panels up to 55 feet long and 24 inches wide have been laid.

The system is becoming popular due to its suitability for use on the wide, low pitched roofs of contemporary buildings. British practice, however, restricts the length of panels to a maximum of 30 feet, and of flat sheet to 18 inches, giving a finished width between centers of standing seams of 15¼ inches. The main advantage of relatively long panels is that cross seams can be eliminated on most roofs, which is desirable on low pitch applications.

Though scattered applications can be noted the market for metal tiles has always been small. Tiles are generally fixed to timber roofs; and such roofs are mainly confined to domestic buildings where for aesthetic reasons the clay or colored concrete tile is usually preferred. However, a limited number of buildings have been roofed with aluminum tiles, notably a church in Chelsea where color anodized tiles were used.

### Common Types of Seams



■ *Top diagram shows batten roll seam, bottom shows standing seam. This is becoming most popular of two because of elimination of timber.*

## 25 Million Sq. Ft. Annually

Although aluminum has been in general use as a roofing material for little more than 10 years, its development has been rapid. Over 100 million square feet of corrugated sheet and 30 million square feet of decking have been installed.

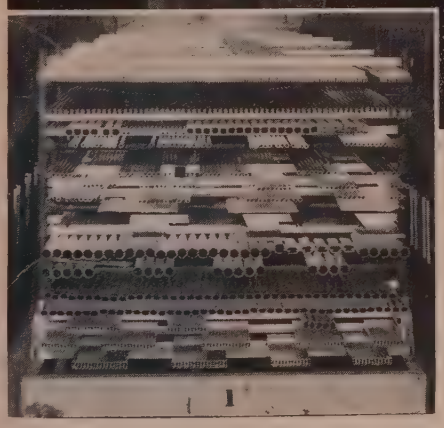
Sufficient experience in all types of buildings has now been obtained to substantiate aluminum's quality as a cladding material. The many forms in which it is now available insure that it can be specified for all types of building applications.

The growing awareness of architects of these factors will undoubtedly result in the increasing use of aluminum for all types of cladding. It is available in many profiles for industrial buildings and it is probable that bolder profiles having concealed fastenings will be in demand. This demand is being brought about by the greater attention of industrialists to the architectural standards of factory buildings, which in many cases are situated where poor appearance would rightly be criticized.

In the architectural field, the trend to low pitch or flat roofs and curtain wall systems will call for the wide use of deck roofing and proprietary concealed fixing systems.

As a cladding material aluminum has been tested under the severest conditions by a critical industry and found to be acceptable. Taking into account all present trends, it is reasonable to suppose that during the 1960's the building industry will use aluminum cladding at the rate of at least 25 million square feet per year.

# Aluminum extrusion plant chooses "OLIVER" 94-DHX as "finest equipment money can buy"



*Mideast Aluminum Corp. officials state that Oliver Saw proves its efficiency, dependability, versatility and speed under actual production conditions.*

Ray B. Sowers and Robt. J. Gilfillan, President and Vice President, respectively, of Mideast Aluminum Corp., Dayton, N.J., chose Oliver's 94-DHX Cut Off Saw for their own semi-automated modern aluminum extrusion plant "in keeping with their policy of buying the finest equipment that money can buy."

The Oliver Saw proved itself, says Mr. Gilfillan, "when we ran it constantly for 24 hours a day, 6 days a week for months on end with absolutely no maintenance down time while cutting hard alloys (2014S) where squareness of cut was ¼ commercial tolerance."

"In our operation we specialize in high production of small extrusions; consequently our equipment must be fast, rugged, versatile and, above all, maintenance-free. Your saw more than meets these requirements," states Mr. Sowers.

Send for folder giving full details of the Oliver 94-DHX.

**OLIVER MACHINERY COMPANY**

**GRAND RAPIDS 2, MICHIGAN**

## SHIPMENTS OF ALUMINUM PRODUCTS IN THE U.S.–1945 THROUGH 1959

(thousands of tons)

| Year | Sheet, Plate and Foil | Rod, Bar, Wire & Cable | Extrusions, Drawn Tube, Welded Tube | Castings—Sand, Perm. Mold & Die | Misc.—Powder, Paste, Forgings, Metallurgical and Deoxidizing | Total |
|---|---|---|---|---|---|---|
| 1945 | 370 | 64 | 83 | 186 | 209 | 912 |
| 1946 | 434 | 66 | 63 | 195 | 72 | 830 |
| 1947 | 550 | 78 | 61 | 234 | 75 | 998 |
| 1948 | 634 | 91 | 86 | 235 | 78 | 1,124 |
| 1949 | 395 | 101 | 75 | 175 | 72 | 818 |
| 1950 | 581 | 135 | 129 | 271 | 88 | 1,204 |
| 1951 | 536 | 172 | 156 | 257 | 97 | 1,218 |
| 1952 | 542 | 222 | 173 | 259 | 102 | 1,298 |
| 1953 | 684 | 211 | 225 | 329 | 117 | 1,566 |
| 1954 | 582 | 180 | 256 | 312 | 108 | 1,438 |
| 1955 | 770 | 184 | 388 | 411 | 126 | 1,879 |
| 1956 | 784 | 210 | 396 | 397 | 126 | 1,913 |
| 1957 | 697 | 198 | 395 | 376 | 118 | 1,784 |
| 1958 | 676 | 173 | 411 | 321 | 101 | 1,682 |
| 1959 | 879 | 222 | 541 | 392 | 120 | 2,154 |
| **TOTAL** | **9,114** | **2,307** | **3,438** | **4,350** | **1,609** | **20,818** |

# Aluminum Supply and Consumption Since 1945

AS THE two tables on this page show, 1959 was the biggest year for the aluminum industry by a good margin – and with production facilities running at about an average of 82% capacity. If current projections prove accurate, demand this year will exceed 1959 by at least 200,000 tons.

There has been almost a four-fold expansion of aluminum demand since the end of World War II. From the standpoint of supply, imports have about doubled since 1948, while ingot smelters have also nearly doubled their shipments in the same period. These two sources of supply are about equal – 3,255,000 tons having come from imports, while the smelters produced 3,435,000 tons of aluminum since 1945.

At the end of World War II, Alcoa and Reynolds were producing about 450,000 tons of metal. This year six aluminum producers are now pouring four times that amount. The entire industry has produced over 16 million tons of primary aluminum since 1945.

On the consumption side, casting plants, fabricators and product manufacturers have used over 20 million tons of aluminum in 15 years. The number of these firms has risen from 4500 at the end of World War II to 25,000 today – better than a five-fold increase.

Rolled products – sheet, plate and foil – currently account for over 40% of total shipments. But the growth rate of these products has been slow compared to extrusions. Demand for the the former jumped from 370,000 tons in 1945 to nearly 900,000 last year, while sales of aluminum extrusions rose from an average of about 70,000 tons a year to current shipments of nearly 400,000 tons.

During this same period castings demand (primarily die castings) doubled from the 200,000 tons to nearly 400,000 tons last year. Smaller volume products – rod, bar, wire and cable – jumped from 70,000 tons to 222,000 tons last year. Miscellaneous uses–powder, paste, forgings deoxidizing and metallurgical purposes – did not quite double during the past 15 years.

Major impetus for this large demand has come from two basic industries – building and transportation–which currently consume about 800,000 tons, or roughly 40% of total shipments.

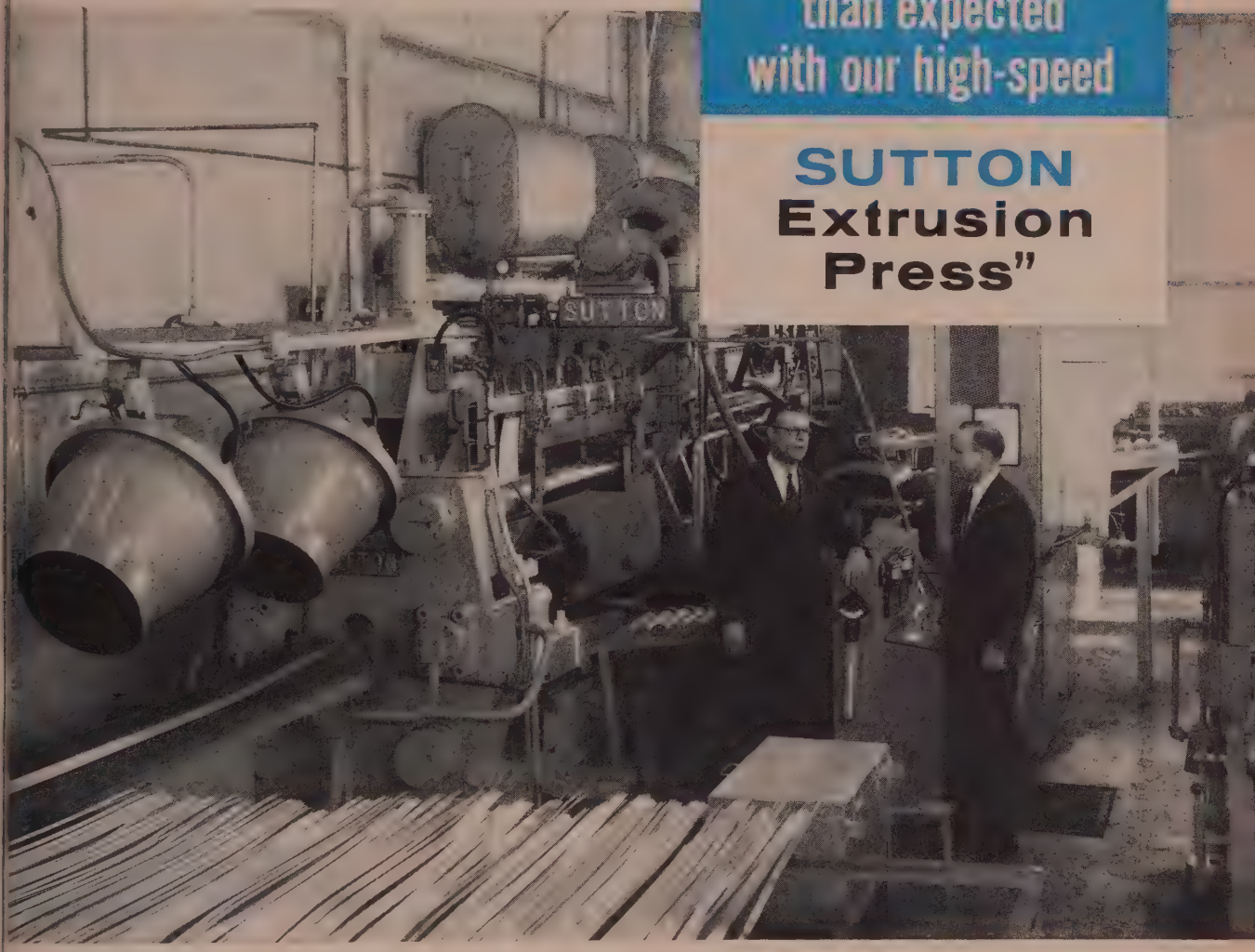
## TOTAL ALUMINUM SUPPLY–1945 THROUGH 1959

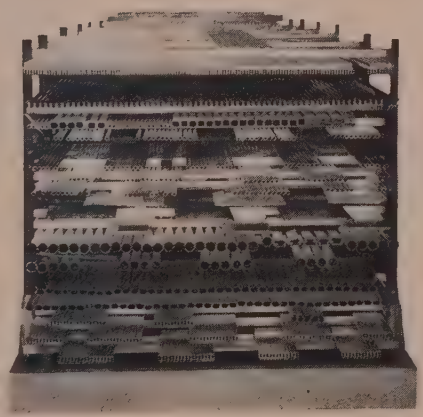
(thousands of tons)

| Year | Production Primary | Production Secondary | Imports | Total |
|---|---|---|---|---|
| 1945 | 495 | 198 | 341 | 1,034 |
| 1946 | 409 | 204 | 57 | 670 |
| 1947 | 572 | 190 | 31 | 793 |
| 1948 | 623 | 180 | 161 | 964 |
| 1949 | 603 | 117 | 125 | 845 |
| 1950 | 719 | 179 | 256 | 1,154 |
| 1951 | 837 | 201 | 162 | 1,200 |
| 1952 | 937 | 233 | 151 | 1,321 |
| 1953 | 1,252 | 251 | 360 | 1,863 |
| 1954 | 1,460 | 219 | 242 | 1,921 |
| 1955 | 1,565 | 299 | 241 | 2,105 |
| 1956 | 1,679 | 299 | 266 | 2,244 |
| 1957 | 1,648 | 294 | 260 | 2,202 |
| 1958 | 1,566 | 239 | 296 | 2,101 |
| 1959 | 1,953 | 332 | 306 | 2,591 |
| **TOTAL** | **16,318** | **3,435** | **3,255** | **23,008** |

Ray B. Sowers, President
Mideast Aluminum Corporation Reports:

# "30% More Production than expected with our high-speed SUTTON Extrusion Press"



Hollow and semi-hollow aluminum shapes with walls down to .035" are produced at high production speeds.

Talk to Ray Sowers of Mideast Aluminum and you will find that their 625 ton Sutton press is helping to make possible a most profitable and satisfactory operation for both extruder and customer.

Speedy cycling increases production while the high pressure exerted on the die permits extrusion at the bottom of the metallurgical temperature range for superior finish.

And—their new Sutton press produced salable material within 5 days after delivery and has never been down for maintenance! Typical? We think so and would like a chance to prove to you that Sutton presses merit first consideration for faster production, quality of end product and extreme reliability.

*Ask for Bulletin 50*

**SUTTON** *Engineering Company*

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PHONE GRANT 1-8077 PLANT: BELLEFONTE, PA.

Manufacturers of Hydraulic Extrusion Presses • Straighteners • Centerless Bar Turners
Rotary Swagers • Sheet Levelers and other Finishing Machines for Modern Metals

# News Products and People

## New Florida Causeway Loaded with Aluminum

The 36th Street Causeway, the Florida Road Department's $14 million link between Miami and Miami Beach, is loaded with aluminum applications. Besides being equipped with four miles of aluminum chain link fence, it boasts almost two miles of aluminum bridge railing, 270 tapered aluminum light standards and over 22 miles of aluminum electrical conductor.

In addition, aluminum signs, both of the post and panel type and large road-spanning type, are used here as elsewhere on Florida highways.

"Our selection of aluminum was based on our longstanding practice of using what we have determined to be the best material for a particular job and giving the people of Florida the most for their money over the years these roads and bridges will be in use," a department official said. "Our engineers chose aluminum primarily because this is a highly corrosive salt water area and our experience has shown aluminum requires little or no maintenance. Attractiveness was also a factor."

Howard M. Post, Miami engineer for the State Road Department, said the saving in maintenance costs was an important factor in selecting aluminum bridge rail.

Road Department officials said this was the first such use of buried aluminum electrical conductor on a Road Department project and that aluminum conductor has now been approved for use on virtually all state road projects.

F. J. Thomiszer, Reynolds Metals Company sales representative, said he knew of no other aluminum chain link fence installation in southeast Florida as long as this one. Reynolds supplied most of the aluminum.

Department officials said a wide use of aluminum would also be made in the construction of other parts of the $168,700,000 interstate expressway system for the Miami area.

## Drawn Tubing Facilities Added to Reynolds Plant

Reynolds Metals Co. has completed drawn tubing facilities in a new 30,000-square-foot addition to its Bellwood extrusion plant near Richmond, Va.

Included in the $500,000 addition is a new 200-foot drawbench which can produce five tubes at a time at speeds up to 400 feet per minute.

Construction of the addition took nine months and increases the size of the plant to 260,000 square feet. Reynolds' Eastern tubing customers now benefit by greatly reduced lead times, compared with orders which had to be placed on the company's Phoenix plant.

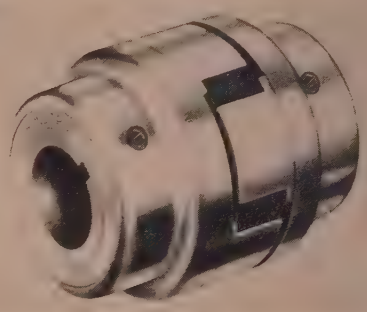
## New Sun-Shade, Grille Comes in Three Designs

The continuing quest for new forms in architecture has led to the design of Alshade, the second in Alcoa's line of solar shading and decorative grilles. Now available in a "Shad-O-Wheel" version, additional patterns are contemplated.

Three variations of this design are now being produced: A unit consisting of front and back mating circles having an overall depth of four inches; a single circle with a special back plate, and having a depth of 2-9/16 inches; and a unit consisting of two mating back-up plates assembled back-to-back.

All three are finished in a choice of 11 colors, part of the firm's Alumalure line. An accessory extruded frame, available in the same colors, is optional.

Uses of Alshade include refacing old buildings, overlays for lobby walls, vision screens in terraces, gardens, and swimming pool areas, etc. It is priced on a square-foot basis.



## Many Advantages Claimed For Lightweight Couplings

Flexible, insulated couplings for light duty applications are products of the Charles Bond Co., 621 Arch St., Philadelphia 6.

Called Bondtru, the couplings are made in six sizes with 20 standard bore sizes ranging from ¼ to 1½ inch; also, other than standard bore sizes and taper bores are available. They are furnished with keyways and set-screws. They will transmit up to 10 horsepower at 1800 r.p.m.

The couplings have only three parts —two aluminum flanges with projecting segments that engage each other through a non-metallic insert which carries the load in compression. The non-conducting insert also eliminates both static and dynamic electricity, absorbs shock and torsional vibration. All edges of the couplings are rounded to promote operation safety.

The couplings weigh from approximately five ounces up to two pounds; this is up to 60% less than comparable iron couplings, the manufacturer points out.

*care* Extra care is the vital ingredient, experience and development the guide, and maximum service the goal set for every Blaw-Knox Roll.

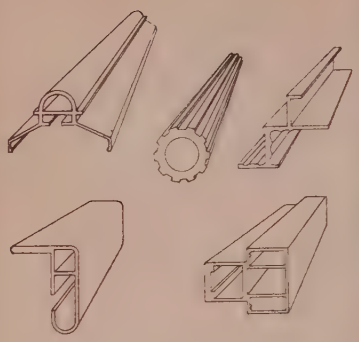
For more than a century, our rollmakers have worked closely with the metal rolling industry to achieve greater standards of performance and quality.

Blaw-Knox Roll Engineers welcome the opportunity to join with you in selecting and applying rolls of the proper grade and design for your operations.

Blaw-Knox Company, Foundry and Mill Machinery Division, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

**BLAW-KNOX**

**ROLLS**



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**FACILITIES INCLUDE:**

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**5569 N. Riverview Drive, Kalamazoo, Mich.**

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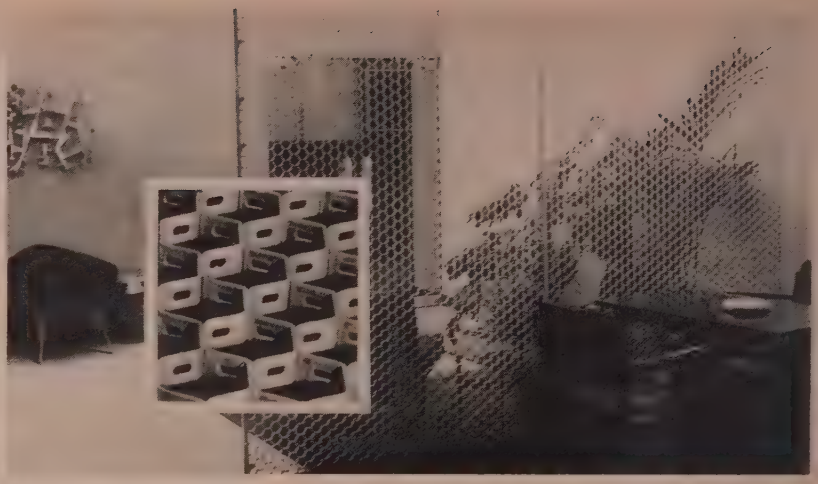


## Mass Produced Ornamental Grilles Have 'Custom Look'

A new ornamental grille of honeycomb design which fills a need for large, maintenance-free screens for modern buildings, is now manufactured by Irving Subway Grating Co., Inc., Long Island City, N. Y.

Mass produced Aluminum Gridsteel provides the designer with a comparatively inexpensive grille having beauty of design and texture and at the same time allowing great flexibility in scale and diversity of application, the company said.

Aluminum Gridsteel is furnished in either rigid or flexible panels of various sizes for curved or flat applications in interior or exterior uses such as sun deflectors, wall panels, canopies, decorative trim, and contoured ceilings. It may be imbedded in floors or ceilings where the hexagonal pattern will suggest a mosaic tile effect.

Due to the depth of bars from which it is manufactured, Aluminum Gridsteel appears to have a third dimension. Viewed at right angles it provides an open appearance. From any other angle a textured impression is presented.

Aluminum Gridsteel is available in anodized colors or may be painted when changes in color are desired. It is also furnished in mill finish, clear lacquered, or clear anodized. Attractive effects may be obtained by filling it with plastic or covering the mesh with translucent plastic sheeting, frosted glass or other material, the manufacturer added.

In the photo above, white painted Gridsteel is used as divider in gown showroom.

Aluminum Gridsteel is made of aluminum bars so formed as to provide a honeycomb mesh when they are fastened together by means of integral lugs clinched through corresponding slots in adjoining bars (inset in photo). Depth of bars can be from ¾ to 1½ inches, thickness of bars either .083 or .100 inch. Standard panel sizes are 3 x 10 feet, 4 x 8 feet, and 4 x 4 feet. Special sizes are made to specifications. Panels may be rigid or flexible. Flexible panels may be formed by hand on the job into various radii down to 1 foot, 9 inches.

## New Screw Machine Alloy Offers Better Properties

A new aluminum screw machine stock alloy which promises to become a standard in the screw machine products business has been brought out by Aluminum Co. of America, Pittsburgh 19, Pa. Alcoa expects its new alloy X6262 to replace alloy 6061, which is one of the four standard screw machine alloys.

Preliminary tests indicate that X6262 has better machinability, corrosion resistance, and finishing characteristics than screw machine stock alloys 2017 and 2024, the Alcoa announcement said. Although free machining alloy 2011 has the best machinability, alloy X6262 is superior to alloy 2011 in both corrosion resistance and finishing characteristics.

Alloy X6262 is available in -T8 and -T9 tempers at the same price as 6061-T6 stock. The -T8 temper has a tensile strength of 58,000 psi, a yield strength of 56,000 psi, and elongation of 14%. Tensile strength in -T9 temper is 62,000 psi, yield strength is 61,000 psi, and elongation is 10%. In either temper it offers up to 25% greater yield strength than any other standard screw machine stock alloy, according to Alcoa.

"Because of its superior characteristics, we expect X6262 to become a standard in the screw machine products industry, replacing alloy 6061, and possibly supplanting other alloys in some applications," said Robert J. Ogden, Alcoa's manager of screw machine stock sales.

# growing! growing! growing!

## TO BETTER SERVE YOUR NEEDS

**Quaker State Metals Company has just added 45,000 square feet of production space to give you faster service, more individualized attention, better products.**

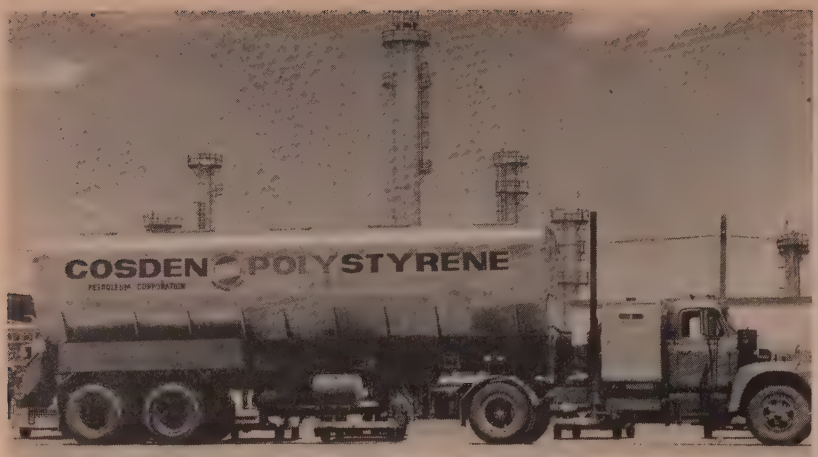
The QSM story is one of growth! Growth to serve our customers better. Since 1957, the company has quadrupled its production space. The newest equipment and machines have been added, and the latest production techniques introduced to control the quality of QSM aluminum—from casting to finished coil and sheet.

To you, this growth means that QSM can give you faster service, more individualized attention, and better products. Want proof? Ask anyone on our growing list of satisfied customers!

**QUAKER STATE METALS CO. • LANCASTER, PA.**

*A Division of HOWE SOUND COMPANY*

*Mill Producers of Aluminum Sheet and Coil*




## Aluminum Offers Two Advantages in Plastic Hauling

Six aluminum pneumatic unloading trailers are now in service hauling highly sensitive polystyrene plastic as part of a new "direct to user" delivery service.

The 28-foot long aluminum units were designed and built by Sprout, Waldron & Co., Inc., Muncy, Pa., for Cosden Petroleum Corp. Big Springs, Texas. Using the light metal achieved a weight savings of some 4400 pounds per trailer, making possible an increased payload of that amount, and eliminated the need for an expensive interior coating to protect the plastic pellets.

Each of the trailers has a capacity of 1182 cubic feet, which is equivalent to 17 tons of polystyrene pellets. The high-powered pneumatic unloading system permits delivery to the customer at the rate of 15 to 20 tons per hour.

The trailers are loaded by gravity from overhead storage tanks which drop the pellets to a compartmentized tank. Each compartment is equipped with a drop door directly above a drag conveyor which runs the length of the trailer. For unloading, pellets are conveyed to an air lock feeder also constructed of aluminum, at the rear of the trailer which introduces the material into the air stream with a minimum loss of pressure.

Fabricated from alloy 5086 sheet and plate, a high-strength weldable alloy developed by Kaiser Aluminum & Chemical Corp., and alloy 6061 extrusions, the trailers are of all-welded construction.

Delivery and storage in bulk substantially reduce warehousing and other handling expenses and the risk of contamination of the critically sensitive material.

METAL PUMPING SERVICES INC.
pumps for zinc and aluminum alloys
METAL PUMPING SERVICES INC.
BOX 3991, CLEVELAND 20, OHIO
PHONE SW 1-6160

## One Motor for Outboard-Mower Package

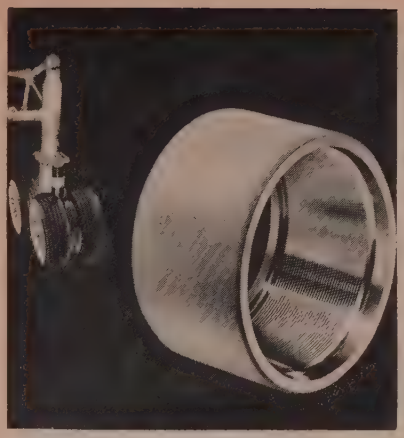
A unique power lawn mower and outboard motor combination, powered by a transferable gasoline engine, is a new product of the Acco Power Products Division of American Chain & Cable Co., Inc., Bridgeport 2, Conn. The whole package retails at about $150, the approximate price of a comparable outboard motor alone.

The prime mover is a 2½ h.p., 4-cycle engine, rated at 3600 r.p.m. The entire rig measures 43 inches high, 10¼ inches for the engine and 32¾ inches for the propeller assembly. Propeller blade is 7 inches in diameter. Deck of the mower is a permanent mold aluminum casting; the shell of the propeller assembly is also of aluminum.

Tecumseh Products Co., Tecumseh, Mich., makes the Acco Dyna-Pak engine.

In one test of the outboard unit, the motor drove a 200-pound, 14-foot boat carrying three men weighing an average of 175 pounds each at speeds ranging from 4 to 7 miles an hour. With a crew of one, the boat was capable of speeds of 8 to 10 miles an hour.

The total package weighs about 43 pounds. Conversion from mower to outboard can be made in a matter of minutes, the manufacturer reports.



## Plastic-Clad Aluminum Used in Landing Gear

The combination of thermosetting laminated plastics and aluminum tubing has provided important weight reductions in hydraulic pistons for aircraft landing gears. It also affords high strength-weight characteristics and eliminates metal-to-metal contact.

Synthane Corp., Oaks, Pa., supplies a phenolic laminated plastic which is bonded to an aluminum base in the manufacture of shock-absorbing struts used in landing gears of commercial and military planes.

Plastics are permanently applied to aluminum cylinders by applying heat and pressure, and heating at a later date will not re-soften material. The aluminum is knurled prior to application.

The resulting product resists corrosions and attacks by lubricants or hydraulic fluids. And, by avoiding metal-to-metal contact, "seizing" is eliminated. This means the inside of the cylinder is free from the effects of weather or from hydraulic oil on metals.

## New Mist Suppressant for Anodizing, Bright Dips

A new fume and mist suppressant for use in anodizing, bright dipping, chrome plating and other metal finishing processes where gas generation is a problem has been developed by Allied Research Products, Inc., Baltimore, Md.

Designated as ARP No. 21 Mistex, this new liquid material forms a thin foam blanket on the surface of the process solution. This blanket reduces fuming by trapping gas bubbles as they rise from the solution and absorbing both the gas and the vapor in the bubbles. It also appreciably reduces solution loss from mist or spray and, further, reduces drag out as work is removed from the bath.

Substantial heat savings are also realized by the reduced need for ventilation. Formulation of the compound is such that the foaming action does not interfere with the process or the balance of the bath.

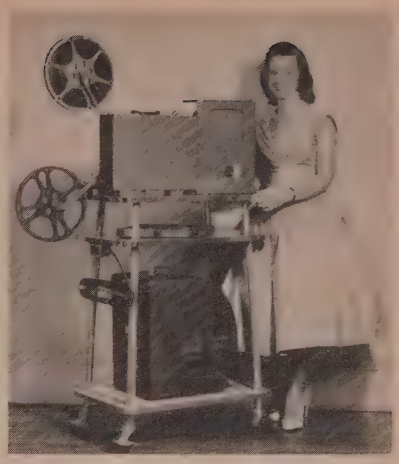
ARP No. 21 Mistex is supplied in concentrated liquid form and is diluted with water in ratios varying from three to 20 parts before adding to the bath. Precise dilution depends upon the conditions under which it is to be used. The only control required is a visual inspection to make sure the foam blanket is maintained at a uniform and consistent thickness of approximately ½ inch.

## All-State Triples Spooled Aluminum Wire Production

Production capacity for spooled aluminum wire will be tripled by All-State Welding Alloys Co., White Plains, N. Y., when equipment being added to the home plant and the company's South Gate, Calif., facility, goes into production. This will mean faster deliveries of extruded, bright finish aluminum wire for use in automatic welding machines.

The firm now can spool in 1 and 10-pound units, aluminum 1100, 4043, 718, 5154, 5554, 5356, 5183 and 5556.

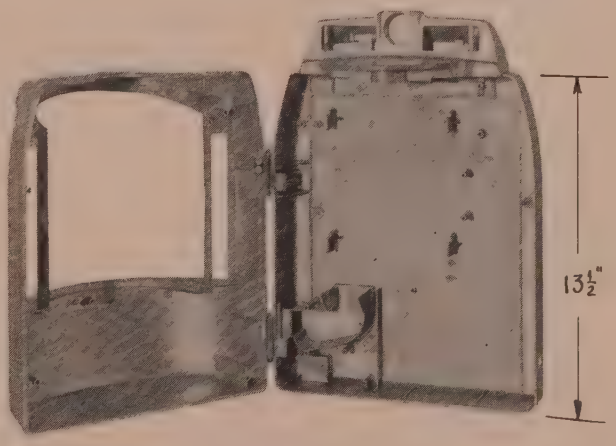
Next, All-State will spool various grades of magnesium, copper, stainless steel and mild steel wire.



## Special Tables Are Lightweight, Strong

A line of tables specially designed for television equipment, projectors and tape recorders, are made by Miller Mfg. Co., 3310 E. Roxboro Road, N. E., Atlanta, Ga.

Tables are made in a variety of heights and shelf dimensions. Model TV-1830-E (pictured) has uprights of polished drawn aluminum tubing, 1¼-inch O.D., .049-inch wall. Aluminum edging for the plastic-laminated ¾-inch plywood shelves is mechanically polished.


Die Castings with sweeping curves and intricate detail are "born to shape" each time. In this assembly, Zinc and Aluminum die castings are combined with finishes most advantageous to that material.

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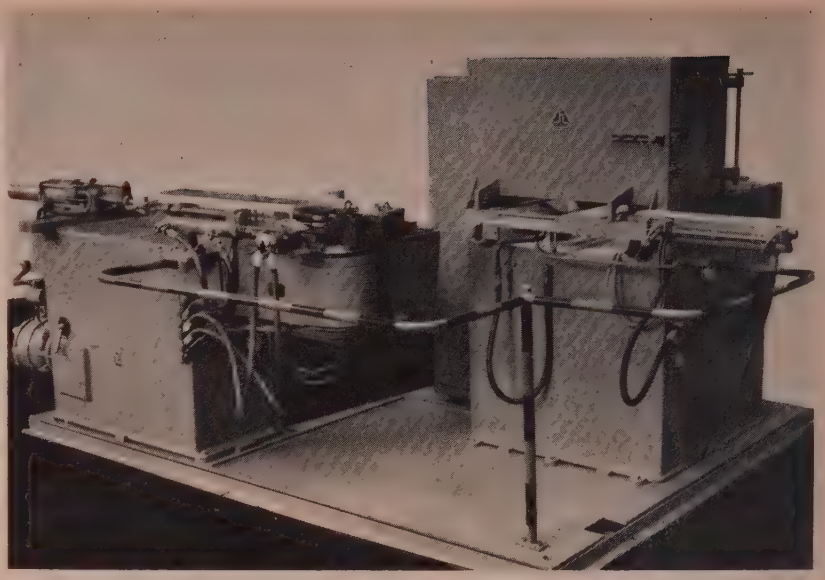


## German Tube Bending Machines Sold in U. S.

A line of semiautomatic and automatic high-speed tube bending machines manufactured by Hilgers Maschinen and Apparate-Bauanstalt mbh, Germany, are available in the U. S. and Canada through Ernst Wachsmuth & Co., 104 E. 40th St., New York, 16.

The German firm has developed three machines which they say cover most jobs. However, accessories can be added to handle special situations. The machines can handle simple right angle bends, such as used for aluminum conduit, and complicated multiple bends, as needed for automotive exhaust pipes. Speeds for simple bends range from 450 per hour to 650 per hour, when twin mandrels are used.

The machine pictured is for high rate series production and changing bending programs. It is fitted with a combined automatic hydraulic positioning and angular turning device, and automatic feed unit. Tubes are stored in a magazine, from which they are automatically taken, pushed into the machine, processed and unloaded. The machine can be adjusted for wall thickness and length.

Right or left hand turning of tubes up to 360 degrees can be done. Up to 12 different angles can be made, and 12 turning angles with successive bends in 12 different planes, and up to 12 different straight tube legs between bends are allowed.

Other machines are available for small series work and short batch work, and for one bend in a tube length, adjustable to 180 degrees, for high rate production. Three sizes are available in each unit: for tubes up to 1¼-inch O.D., 2-inch O.D., and 2-¾-inch O.D., all with 0.080-inch wall thickness.

Length of each machine can vary with customer requirements, while hourly capacities will vary with length of tube, number of bends, size of angle.

## Use of Aluminum Rises in Plant Building, Upkeep

Use of aluminum in plant construction and equipment climbed to 1.1 billion pounds in 1959 and will move upward to over 1.3 billion pounds in 1960, according to Reynolds Metals Co.

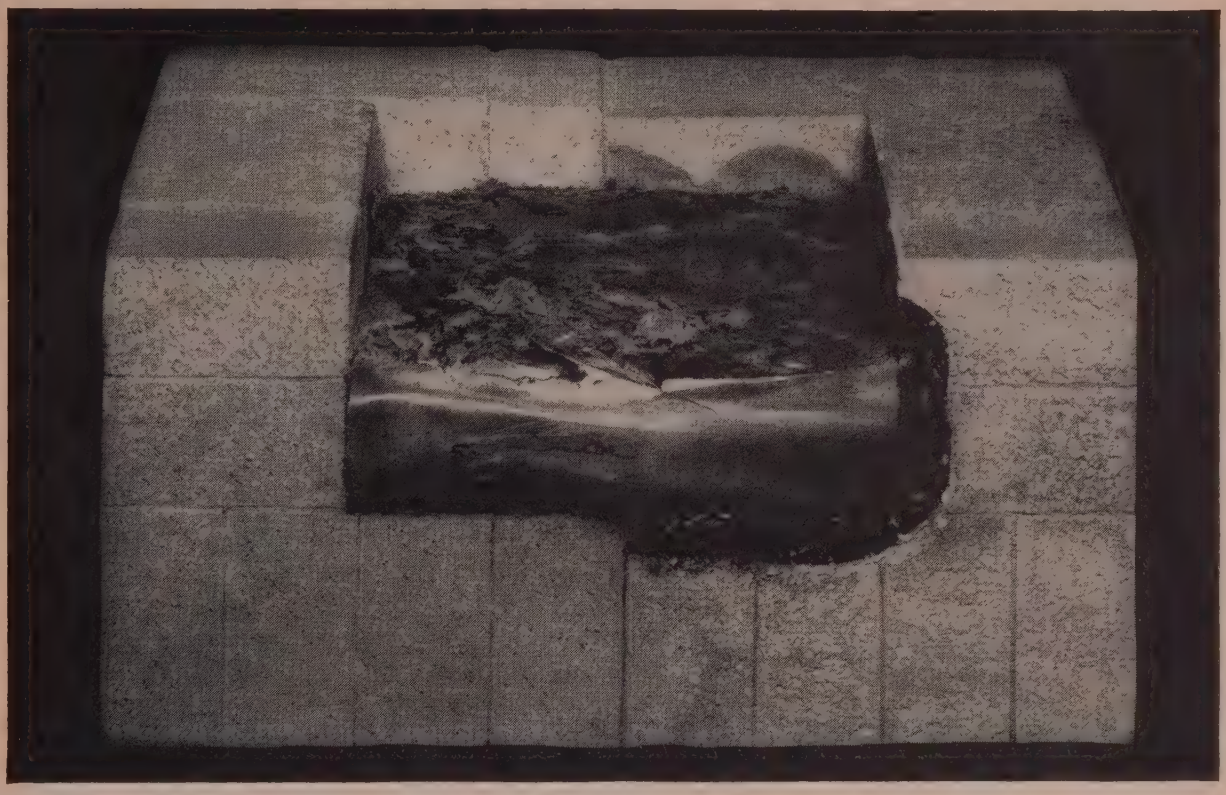
"New industrial applications of aluminum and growing realization of the savings aluminum offers in plant maintenance and operation account for last year's jump of about 30% over the 1958 figure," said W. T. Ingram, Reynolds general sales manager.

"In many cases aluminum-clad factory buildings are saving their owners up to 80% in maintenance costs. And items like aluminum bus duct, silver-plated aluminum bus bar, electrical cable, conduit, piping, heat exchangers, insulation jacketing, ladders and scaffolds are helping him to achieve a better, more efficient operating pace."

Ingram said that probably the most significant recent aluminum development for industry is the new all-aluminum housing for outdoor switchgear, engineered jointly by Allis-Chalmers Mfg. Co., and Reynolds.

Through use of labor-saving devices such as extrusions. aluminum switchgear housing can be manufactured at costs comparable to steel housings fabricated through normal methods. It offers low maintenance, corrosion resistance and attractive design possibilities. Its

**CORAL** *shows superior resistance to molten aluminum.* In this photograph of a laboratory furnace hearth used for testing aluminum melting furnace refractories, the hearth has been cut in half to show relative resistance to penetration by molten aluminum. On the left is the Harbison-Walker CORAL laid with CORALBOND. On the right is a normal high-alumina brick laid with a widely used air-setting bonding mortar.



# Unique refractories developed by HARBISON-WALKER fulfill fast growing needs for aluminum melting furnaces

Among H-W leading refractories developed specifically for modern aluminum melting practice, CORAL brand is particularly worthy of consideration. The unusual combination of physical and chemical properties of this refractory, most highly commend it for the wide diversity of intensified melting conditions.

**CORAL** is a very hard burned brick containing approximately 85% alumina. It is made with a special bond (patent pending) which contributes to its remarkable strength and low permeability. Its transverse strength is three times that of strong fireclay brick. This is the significant criterion of its capacity for withstanding severe impact and abrasion.

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- ***Resistance to*** impact and abrasion accompanying charging of cold metal.
- ***Resistance to*** metal contamination resulting from chemical reaction.

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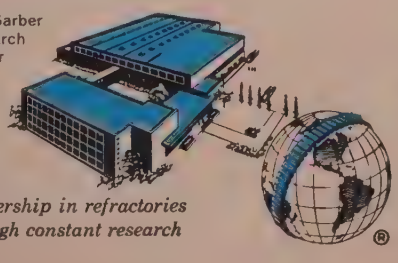

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light weight makes it extremely adaptable for rooftop installations and its heat- reflectivity increases operator comfort and efficiency in hot weather.

Aluminum conduit, which accounted for less than 1% of the total conduit market in 1958, today accounts for almost 10% of the market, Ingram said. He added that there is every indication it will make up 20% of the market in 1960.

"The rapid jump in demand for aluminum conduit stems from the fact that it is 20 to 40% less expensive to install, requires fewer supports and reduces voltage drops because it is nonmagnetic. It has a modern, clean-looking appearance that resists corrosion and never rusts."

The Reynolds executive said many of the same advantages account for the increasing use of aluminum bus conductor and cable, and that generally, the light weight and low-maintenance qualities of aluminum account for most of its uses in other plant operations. Items of equipment such as aluminum scaffolds and ladders are easily portable and can be relocated with little effort. Lightweight moving parts on machinery are less cumbersome to motivate and will not wear as heavily or need maintenance as frequently. Paint-up and replacement is cut to a minimum.

Reynolds' exhibit at the National Plant Maintenance & Engineering Show, held in Philadelphia last month, included a wide range of aluminum applications and products for industry.

These products, made by Reynolds or its customers, include commercial building products, tread plates, paints, gratings, railings, ladders, jacketing, cable trays and racks and aluminum electrical applications such as bus bar and cable.

## Anodizer Chooses Aluminum Bus Bar, Saves Money

Aluminum bus bar produced by Kaiser's K Slab process is being used to feed a 7500-ampere anodizing tank at Aluminum Extrusion Co.'s Los Angeles plant. It is one of the first applications of this type for the new cast product and is reported to be saving money for the user.

The bus was designed to carry a capacity of 840 amperes per square inch. Use of aluminum rather than copper resulted not only in substantial cost savings on the material but also in reduced installation time, according to Larsen-Hogue Electric Construction Co., Los Angeles, contractor on the job.

"The K Slab bus bar cost was approximately 30% of the cost of copper bus with equivalent current capacity," William D. Bonser, Larsen-Hogue engineer and assistant superintendent, said. "We also discovered that because of aluminum's light weight and ease of bending, our installation cost on this particular job was approximately 65% of the estimated cost had copper been used."

Connections to the rectifier and tank were made by silver plating the bus bar ends and bolting the joints. All splices and right angle joints were made by the Cadweld process, and no unusual problems were encountered.

Bus size on the job was ⅜" x 6" x 20 feet. One workman could easily handle the individual pieces which weighed approximately 40 pounds, Bonser pointed out. Photo shows a workman lifting a 28-ft. long section during installation.

## British Firm Uses Foil, Sheet in Radiant Heating

The advantages of underfloor heating systems (low maintenance, even heat, unobstructed floor area and many others) are causing this method of heating to become very popular in Britain. Now Heating Investments Limited, London heating contractor, has introduced an improvement in the forms of aluminum sheet and foil to increase the efficiency of the system.

The aluminum foil is cemented to ½-in. thick expanded plastic heat-insulating sheeting, which in turn is cemented to the tongued-and-grooved wooden subfloor. On top of the foil is laid the warming element, located between 2-inch wide hardboard strips. The foil diffuses the heat from the underside of the element, thus eliminating any heat ridging, with a corresponding reduction of any downward heat loss.

When the resistance cable has been laid and infilled with a special compound, 3-foot square sheets of aluminum alloy supplied by Northern Aluminium Co. Ltd. are cemented on top, spaces being left between the sheets to allow for expansion. The aluminum sheets are finally covered by fitted carpets, linoleum, or any other form of floor covering as required. Because aluminum is an excellent conductor of heat, a very quick heating response is obtained, in contrast to conventional floor warming systems in which the heating elements are covered with a dense top screed.

This ingenious use of aluminum both as a heat diffuser and as a low surface temperature radiant and conductive floor panel adds appreciably to the efficiency of the electric underfloor heating system. The resulting economy in power consumption possible with fully automatic operation is expected to encourage its more widespread use.

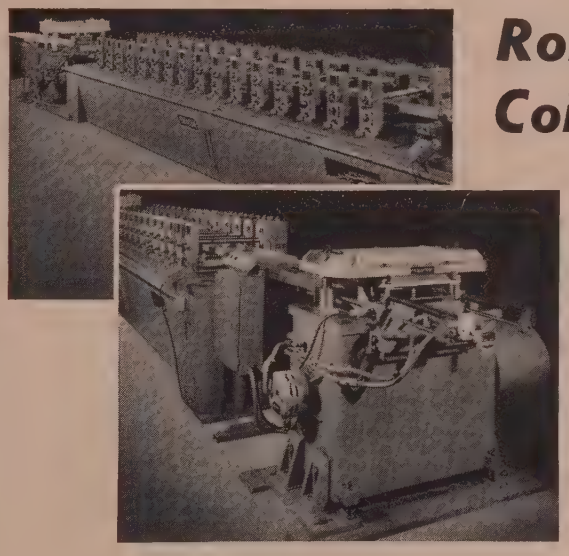
## Alcoa Buys Wire Maker and Building Products Firm

Within one week's time late last month, Aluminum Co. of America announced the purchase of two companies in widely differing fields of endeavor. On January 19, Alcoa disclosed that it had purchased Rea Magnet Wire Co., Inc. One week later came the announcement that Alcoa had acquired Cupples Products Corp., big St. Louis-based manufacturer of aluminum building products. Both companies were acquired in exchange for Alcoa common stock.

Rea Magnet Wire Co. manufactures copper magnet wire for use in electrical and electronic equipment. The 27-year-old concern employs some 770 people in its two plants at Fort Wayne and Lafayette, Ind. Alcoa will continue the fundamental policies of the Rea management, and plans no major changes in personnel or operating procedures.

Rea specializes in smaller sizes of magnet wire for coil windings, transformers, motors, and other electrical and electronic equipment. One objective of the new association between the two companies is to "coordinate their facilities in order to achieve significant advances in the development of aluminum in the magnet wire field."

The move is another step in the continuing campaign of the aluminum

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producers to intensify their invasion of the electrical products field, an industry that promises an enormous potential for aluminum. Heavy duty cable and other "bulk" items account for a major share of the already large tonnage of aluminum used in electrical goods.

Rea's price was 180,480 shares of authorized but unissued Alcoa common stock. At $95.00 per share (as of Feb. 10) the purchase price would be $17,145,600. Rea's 1959 sales were about $23.6 million.

Alcoa acquired Cupples Products for 64,209 shares of authorized but unissued common stock, valued (as of Feb. 10) at $6,099,855. Cupples' 1959 sales approached the $14 million mark.

Cupples Products produces, sells, erects and installs aluminum doors, window frames, curtain walls, and other aluminum products such as highway railing. It currently employs about 880 people at plants in St. Louis; Dallas, Tex.; and Dowagiac, Mich.

Here again, Alcoa will continue the fundamental policies of the Cupples management and plans no major changes in personnel or operations.

Although Alcoa has, for more than 30 years, vigorously promoted architectural applications of aluminum, and has developed alloys, products, and techniques now employed by all fabricators in the field, the company has never had a finished product fabricating facility.

But the Cupples operation will give Alcoa "a facility with which to accelerate and expand the use of aluminum in residential, commercial, and monumental buildings. Increased use of aluminum in these fields will broaden markets for all companies serving the building industry," the announcement added.

Research, development, fabricating and sales resources of both Alcoa and Cupples will operate together to improve existing building applications of aluminum and to bring new products to the field, Alcoa said.

The building industry is the largest single market outlet for aluminum, and further rapid growth is certain as building codes and zoning regulations are modernized and progress in fabricating, finishing and design techniques is achieved.

## New Equipment for Hardware Manufacturer

Two large die casting machines have recently been installed at the Allen-Stevens plant in Woodside, N. Y.

The Lester-Phoenix machines weigh 16,000 pounds each, are powered by 15 horsepower motors, and stand 7 feet high and over 13 feet long.

"To insure the solidity and precision of the die castings produced on these machines, the metal being cast is subjected to a pressure of 2000 pounds per square inch," said Albert M. Sanders, president of Allen-Stevens. "As a result, each machine must exert an enormous force to keep the dies from opening — over 240 tons."

## Porcelain Shields Magnesium Against Corrosion, Abrasion

"A virtually foolproof method" of preventing corrosion of magnesium alloys has been announced by the Dow Metal Products Co., Division of The Dow Chemical Co., Midland, Mich. The new porcelain enameling finishing system not only prevents corrosion, but also imparts excellent abrasion resistance to magnesium and offers the possibility of adding attractive colors and textures.

Key to the new finishing system is a Dow-developed surface pretreatment which solves the adhesion problem that thwarted previous efforts to porcelain enamel magnesium, Dow said. The pre-

treatment permits the use of standard lead-oxide or lithium-phosphate porcelain enamels already in use on other metals.

Porcelain-enameled panels of magnesium alloy AZ31B have withstood 500 hours of 20% salt spray without corrosion, according to Dow. Panels with bared edges showed little edge corrosion, and no spall back or undercutting because of corrosion at the edges was observed.

Panels exposed to exterior weathering in an industrial atmosphere showed no corrosion and no spall back from the bared edges after five months. When heated to 800° F and immediately quenched in cold water, no spalling because of cold shock resulted.

Dow listed high-temperature engine parts, signs, building panels, cooking ware and home appliances as possible applications for porcelain enameled magnesium.

The new finishing system cannot be used with magnesium alloys of high aluminum content and of high total alloy content because these alloys contain low melting point eutectic. It has been used successfully, however, with alloys of lower aluminum content, the magnesium-thorium alloys, and the magnesium-rare earth alloys.

## Lightweight Punch Makes Job Less Arduous

Punching holes in metal in overhead or other hard-to-get-at locations is especially tiring when the tool is heavy to begin with.

The job is considerably less wearing, however, when the punch is made of aluminum. The tool pictured weighs only 11 pounds, compared with more than 17 pounds for its steel counterpart.

Made by Whitney Metal Tool Co., Rockford, Ill., the punch can produce a ¼-inch diameter hole in ¼-inch thick metal, or a ½-inch diameter hole in thinner stock.


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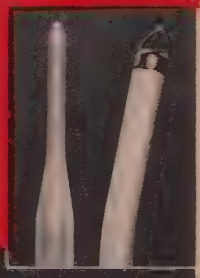

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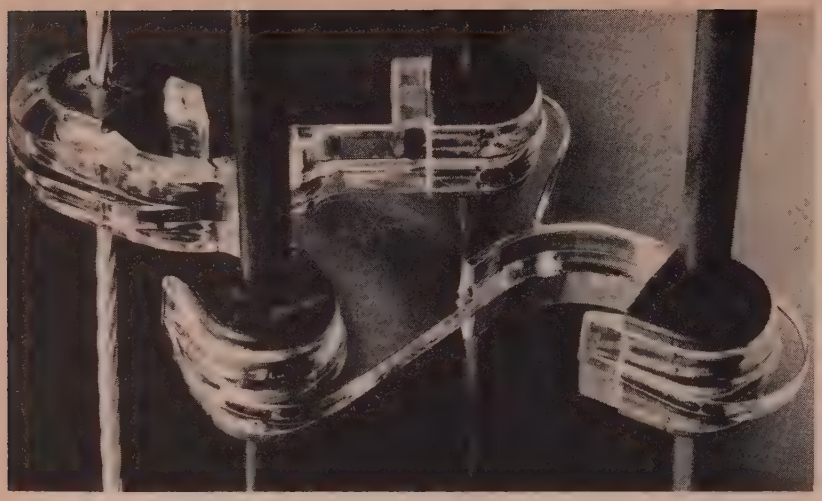

## New Spacer Simplifies Aerial Cable Installations

One of the newest spacer systems for aerial cable installation has been developed by Kaiser Aluminum & Chemical Sales, Inc., Oakland, Calif. It features a simply designed spacer, a new high-strength aluminum messenger, and insulated phase conductors specially constructed for use with spacers.

"Because all the elements are designed to be used together," states J. C. Ferguson, general sales manager of Kaiser's electrical conductor division, "an entire system, installed, costs considerably less than pre-assembled aerial cable and only slightly more than standard open wire."

The spacer, designed for systems operating at 5 to 15 KV, is a compact, high strength, one-piece Plexiglas unit with neoprene grommets, which are slotted to slip around the cable, snap easily into the spacer's guide paths, and are held securely once in position. Only one cable need be handled at a time and installation of each spacer takes only a few minutes. With no movable or removable parts, the spacer is "extremely" reliable.

Cables are held 6 inches apart providing a neat system with easy phase identification. The ⅜-inch aluminum messenger, composed of seven strands, has two strands of EC grade conductor and five strands of Alumoweld. It was designed by Kaiser Aluminum to combine high strength with low resistance. Other types of messengers are also available for use with the spacer system.

Phase conductors are of hard drawn EC grade aluminum with a minimum conductivity of 62% IACS. Both polyethylene and butyl rubber insulations are available with neoprene jacketing.

## GM to Buy Molten Aluminum From New Alcoa Smelter

Details of the aluminum industry's fourth "hot metal" pact with automobile manufacturers were being worked out early this month by General Motors and Aluminum Co. of America.

Contract provisions had not been divulged as of this writing (Feb. 4) but it it is known that GM will use specially equipped ladle trucks to pick up molten aluminum at Alcoa's new Warrick, Ind. smelter and transport the metal approximately 100 miles to GM's big Fabricast Division foundry at Bedford, Ind. Despite this long run, the metal will arrive at the foundry almost hot enough for casting.

The amount of metal covered by the contract has not been disclosed, but one report puts the first year total at 25,000 tons. The effective date of the contract has not been decided, but Alcoa has indicated that it will put one of its five Warrick smelter potlines into operation by mid-May or early June. Allowing time for a shakedown run, deliveries of hot metal to GM could start in July.

The Alcoa-GM arrangement is unlike previous "hot metal" deals in the length of run from potline to foundry. In previous contracts — all involving smelters of Reynolds Metals Co. — the foundries are located close to the smelter, and do not entail transport of metal along public highways. Presumably, the big auto maker has come to terms with state highway officials concerning the hauling of molten aluminum on public roads. The run from Warrick to Bedford is expected to take from 3½ to 4½ hours.

The hot metal idea dates back to February 1950 when Reynolds and GM worked out an agreement under which molten metal was delivered to GM on an experimental basis. The 3-year pact established the feasibility of the arrangement, and in July 1952 the two companies signed a 5-year contract under which Reynolds would sell GM 40 million pounds of molten aluminum per year, the metal to be used at a new foundry which GM built adjacent to Reynolds' Jones Mills, Ark. reduction plant. The contract went into effect January 1954.

The following year, Ford Motor Co. made a similar 10-year deal to buy 64 million pounds of aluminum annually from Reynolds' new smelter at Listerhill, Ala. And in February 1957, GM contracted to buy molten metal from Reynolds' new smelter at Massena, N. Y. Engine parts for the Chevrolet Corvair are now being cast at the foundry which GM built adjacent to Reynolds' Massena smelter.

All of these contracts played an important role in the financing of Reynolds' expansion projects during the past several years. They have also helped the auto makers by eliminating the cost of pigging metal, transporting the pig, and remelting at the foundry.

The Alcoa-GM contract could prove even more attractive economically since it will cost less to ship castings from Bedford, Ind. to engine plants in Flint, Mich., Cleveland, and Toledo, Ohio, than from Arkansas and Alabama. This fact has touched off speculation that GM may cancel its Jones Mills hot metal contract, but it seems unlikely that the company would abandon its modern (and costly) foundry at that location.

## Kaiser Broadens Overseas Activity

Operations of Kaiser Aluminum & Chemical Corp. took on a more pronounced international complexion with reports last month on its activities in Britain, India, South America and Ghana.

In Britain, Kaiser has joined with a well known fabricator in the formation of James Booth Aluminium Ltd. The new company will be owned equally by Kaiser and Delta Metal Co. Ltd., one of the largest fabricators of nonferrous metal products in the United Kingdom.

Kaiser will invest $14 million, half of the initial capitalization of the new company. All of these funds will be used to expand Booth's Kitts Green Works at Birmingham, extending the range of its wrought aluminum products.

D. A. Rhoades, Kaiser president, said Delta will continue management of James Booth, and control of the new company will not pass out of British hands. W. E. Ogden, chairman of Delta Metal, will be chairman of the new company. A. H. Branstad, who has been manager of Kaiser Aluminum's sheet and plate operations, will also serve

as assistant managing director of James Booth.

"Our participation in James Booth Aluminium will permit us to contribute to the development of the aluminum market in the United Kingdom," Rhoades said. "Kaiser Aluminum's function in the new company will be to assist management in all production and marketing activities to obtain our growth objectives."

In the United Kingdom, Booth is one of the five largest manufacturers of wrought aluminum products. The company fabricates aluminum sheet, plate, including stretched plate, extrusions, drawn tube, wire, forgings, and rivets.

In India, Kaiser's interest in an integrated aluminum industry was furthered when the Hindustan Aluminium Corp. Ltd. was granted a loan of $13.6 million by the Export-Import Bank. The money will be used to purchase U. S. equipment, supplies and services to help build an aluminum reduction plant in India.

Hindustan Aluminium is a joint undertaking of Kaiser Aluminum and the Birla interests headed by G. D. Birla. The aluminum reduction facility will be located near Rihand Dam in Uttar Pradesh State, close to extensive bauxite deposits. There will be two facilities, the reduction plant and an alumina installation.

Kaiser officials indicated that construction might start by the end of March and that both facilities will be in operation some time in 1962. Total project costs will be over $30 million.

Kaiser has been active in Ghana's bauxite development from the start, when Kaiser Engineers made the initial surveys of the Volta River power potential, and has taken the lead in formation of Volta Aluminium Co.

In Argentina, Kaiser has teamed up with Guillermo Decker, big nonferrous metals fabricator. A $7 million plant is being built near Buenos Aires.

## Men-on-the-move

**A. E. Petermann,** vice president and general counsel of Calumet & Hecla, Inc., has been named president of Alabama Metallurgical Corp., Selma, Ala. The company is jointly owned by C&H and Brooks & Perkins, Inc., Detroit. **L. G. White,** former president of Alamet, resigned for reasons of health. Petermann will continue as an officer, director and general counsel of Calumet & Hecla.

Aluminum Co. of America has named **John A. MacLeod** works manager of the company's utensil plant at Chillicothe, Ohio. He succeeds Carl C. Yengling, now retired after 33 years' service with Alcoa. The modern plant produces a wide line of aluminum home and kitchen utensils for Wear-Ever Aluminum, Incorporated.

**Thomas J. Ready, Jr.** has been named executive vice president of Kaiser Aluminum & Chemical Corp. "This new position has been created by the board of directors because of the continuing growth of the corporation and the broadening of its activities in many fields," said D. A. Rhoades, president. "Mr. Ready has been a key figure in the rapid development of the corporation in the aluminum industry and has been largely responsible for the building, expansion and efficient operation of our facilities." Ready has been with the Kaiser organization since 1942.

Fairmont Aluminum Co., Fairmont, W. Va., has made two personnel changes and acquired new offices in Cincinnati. **Richard Sill Crane** is new district manager in the Cincinnati area. He previously worked there for Kaiser Aluminum Co. Crane succeeds **A. Joe Snider** who has been transferred to Cleveland where he is district sales manager. The company recently moved into new offices in the Roselawn Center Building, 7374 Reading Rd., Cincinnati 37.


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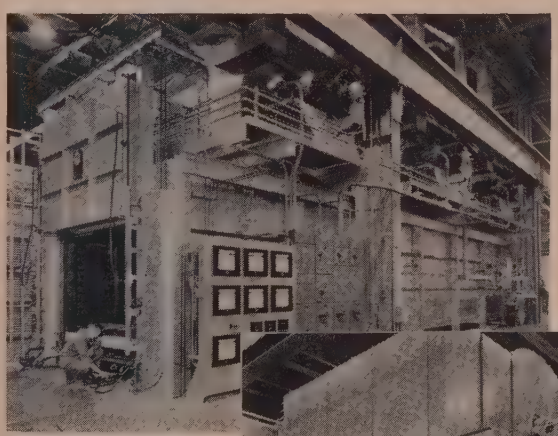
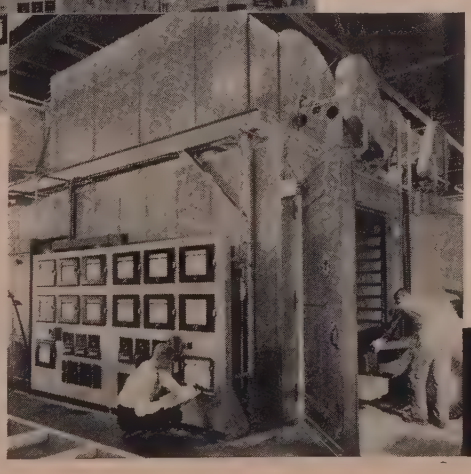


Radiant tube furnace for annealing aluminum straight tubes up to 50' long, 2" tubing in 48" diameter coils and extrusions of various shapes and lengths.

•

Right—Car type ovens for aging aluminum sheet up to 6' 6" wide x 32' long, tubes up to 6" O.D. x 50' long and extrusions up to 16" cross section x 50' long.



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Engineered to heat your aluminum and magnesium products with closely controlled temperature uniformity and at most efficient production rate.

Leading producers and fabricators in the light metal industry—and many smaller plants too—know what "Rockwell-engineered to exacting specifications" means to them.

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# Where to buy... MATERIALS EQUIPMENT SERVICES for the Light Metals Industry

**THIS BUYERS GUIDE IS PUBLISHED FOR THE USE OF PRODUCT MANUFACTURERS AND FABRICATORS WHO ARE SEEKING SUPPLIERS OF MATERIALS, EQUIPMENT AND SERVICES. THE FIRMS LISTED ARE ADVERTISERS IN MODERN METALS, AND CONSTITUTE ALL MAJOR SUPPLY SOURCES.**

## MATERIALS

### ARCHITECTURAL SHAPES

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Kawneer Company
Mill Products Div.
St. Charles, Ill.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### BAR AND ROD

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Corson Industries
Delair, N. J.

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada (Mg)

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan (Al&Mg)

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio (Al)

Harvey Aluminum
Torrance, Calif. (Al)

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa (Al)

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Precision Extrusions, Inc.
721 E. Green Ave.
Bensenville, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas (Al)

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

United States Extrusions Corp.
120 Old Broadway
Garden City Park, L. I., N. Y.

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### BILLET, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Corson Industries
Delair, N. J.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### BILLET, MAGNESIUM

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Co.
Magnesium Department
Midland, Michigan

### BRAZING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

### BRAZING SUPPLIES

Lucas-Milhaupt Engineering Co.
5040 S. Lake Drive
Cudahy, Wisconsin

### BUFFS

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

### BUS CONDUCTOR, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Precision Extrusions, Inc.
721 E. Green Ave.
Bensenville, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

### CALCIUM METAL

Alabama Metallurgical Corp.
Selma, Ala.

Dominion Magnesium Ltd.
320 Bay Street
Toronto, Ont., Canada

### CASTINGS, ALUMINUM DIE

Allen-Stevens Corp.
33-53 62nd St.
Woodside, N. Y.

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n Dow Chemical Co.
Midland, Mich.

Federal Die Casting Company
2226 North Elston
Chicago, Illinois

Madison-Kipp Corp.
217 Waubesa Street
Madison 4, Wisconsin

### CASTINGS, MAGNESIUM DIE

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

### CASTINGS, ALUMINUM, SAND AND PERMANENT MOLD

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Light Alloys Ltd.
320 Bay St.
Toronto, Ont.

### CASTINGS, MAGNESIUM, SAND AND PERMANENT MOLD

Aluminum Co. of America
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The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

Light Alloys Ltd.
320 Bay St.
Toronto, Ont.

### CIRCLES, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Co.
Fairmont, W. Va.

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### CLEANERS, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, New Jersey

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector Street
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### $CO_2$ for CASTING

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

### COATINGS, ELECTRICALLY CONDUCTIVE

Amchem Products, Inc.
Ambler 12, Pa.

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

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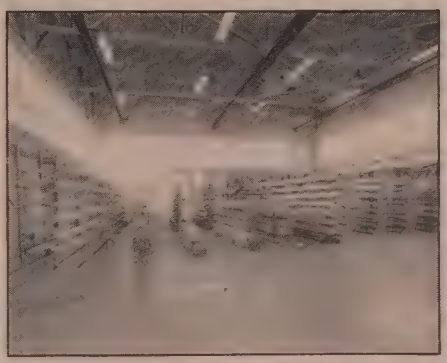

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Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Company
Fairmont, West Virginia

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
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Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

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701 Liberty St.
Jackson, Mich.

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Coil Anodizers, Inc.
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Muskegon, Mich.

Fairmont Aluminum Co.
Fairmont, West Virginia

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New York 16, N. Y.

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Bridgeport Brass Co.
Aluminum Division
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Coated Materials Div.
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Pittsburgh 23, Pa.

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Fairmont, West Virginia

Litho-Strip Corp.
4800 S. Kilbourn Ave.
Chicago 32, Ill.

Pre Finish Metals Inc.
2110 E. Pratt Blvd.
Elk Grove, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

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New York 6, New York

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### COMPRESSED GASES

Liquid Carbonic Div.
General Carbonic Corp.
135 S. LaSalle St.
Chicago 3, Ill.

### CONVERSION COATING, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Egyptian Lacquer Mfg. Co.
P. O. Box 444
Newark 1, New Jersey

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Philadelphia 2, Pa.

### DETERGENTS

MacDermid Inc.
Waterbury 20, Conn.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
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New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### DIE STEELS FOR DIE CASTING

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

### DIE STEEL, EXTRUSION

Ajax Steel & Forge Co.
205 Adair St.
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Latrobe Steel Co.
Latrobe, Pa.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

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Graphite Products Corp.
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Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

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Chicago, Ill.

Northwest Chemical Co.
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Detroit 4, Mich.

### DYES, ANODIZING

Koppers, Inc.
Chemicals & Dyestuffs Div.
Porter Building
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### ELECTRODES FOR WELDING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

### ENAMELS, PORCELAIN ALUMINUM

Ferro Corporation
4150 E. 56th St.
Cleveland 5, Ohio

### ETCHANT, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### EXTRUSIONS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Benson Aluminum Co., Inc.
621 Virginia St.
Connersville, Ind.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Corson Industries
Delair, N. J.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Kawneer Company
Mill Products Div.
St. Charles, Ill.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14757 Meyers Road
Detroit 27, Mich.

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

United States Extrusions Corp.
120 Old Broadway
Garden City Park, L. I., N. Y.

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### EXTRUSIONS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif

### EXTRUSIONS, IMPACT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### EXTRUSIONS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

### EXTRUSIONS, TITANIUM

Bridgeport Brass Company
Aluminum Division
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

### EXTRUSIONS, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### FASTENERS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburg 19, Pa.

Southern Screw Company
Statesville, North Carolina

### FENCING, ALUMINUM

Nichols Wire & Aluminum Co.
Davenport, Iowa

### FILLER METAL, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

### FILLER METAL, MAGNESIUM

All-State Welding Alloys
249-55 Ferris Ave.
White Plains, N. Y.

### FINISHES AND COATINGS, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pennsylvania

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Eastman Chemical Products, Inc.
Kingsport, Tennessee

Egyptian Lacquer Mfg. Co.
P. O. Box 444
Newark 1, New Jersey

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### FLUXES, ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div.
American Smelting & Refining Corp.
120 Broadway
New York 5, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### FLUX, ALUMINUM SOLDERING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
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### FLUX, BRAZING

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

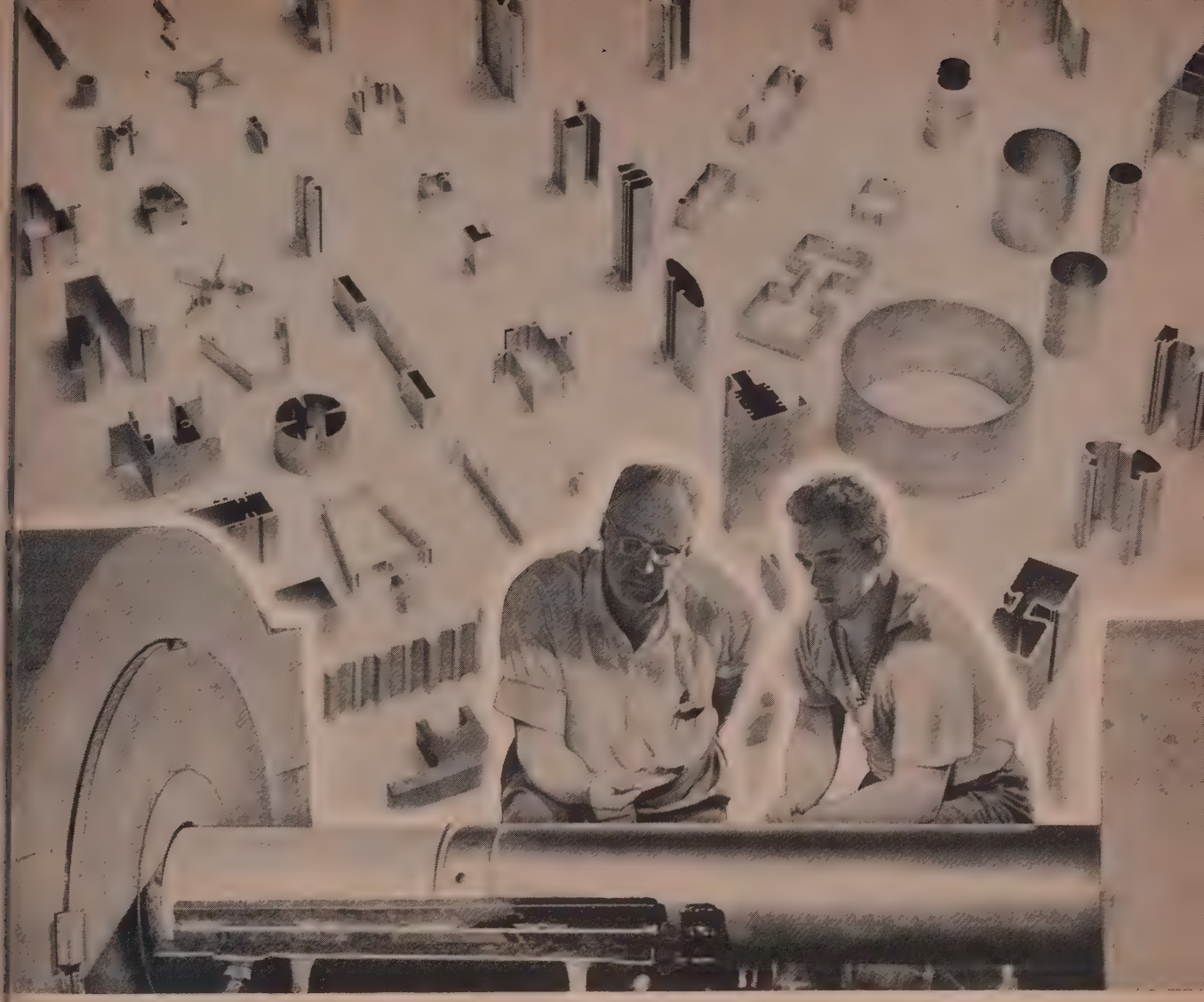
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

Lucas-Milhaupt Engineering Co.
5040 South Lake Drive
Cudahy, Wisconsin

### FLUX, WELDING

All-State Welding Alloys Co. Inc.
249-55 Ferris Ave.
White Plains, N. Y.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.



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General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

### FOIL, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Anaconda Aluminum Co.
P.O. Box 1654
Louisville 1, Ky.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 West Broad St.
Richmond 18, Va.

### FOIL, ALUMINUM, PREANODIZED

Coil Anodizers, Inc.
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Muskegon, Mich.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

### FORGINGS, ALUMINUM

Aluminium Limited Sales, Inc
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn. (Al, Ti)

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Scovill Manufacturing Co.
99 Mill St.
Waterbury, Conn.

Wyman-Gordon Company
Worcester 1, Mass. (Al, Mg, Ti)

### FORGINGS, COLD, NO-DRAFT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

### FORGINGS, EXTRUSION, TOOL

Latrobe Steel Co.
Latrobe, Pa.

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

### FORGINGS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

### FORGINGS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
Aluminum Division
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Wyman-Gordon Company
Worcester 1, Mass. (Al, Mg, Ti)

### FORGINGS, TITANIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Wyman Gordon Company
Worcester 1, Mass.

### FRIT FOR ALUMINUM

Ferro Corp.
4150 E. 56th St.
Cleveland 5, Ohio

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Woodside, N. Y.

Cipco Corporation
22nd & Cole Streets
St. Louis 6, Mo.

Lake Park Metal Stamping, Inc.
1122 Velma Court
Youngstown, Ohio

### HEAT TREATING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

### HIGH PURITY ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

### HINGES, ALUMINUM

Lake Park Metal Stamping Inc.
1122 Velma Court
Youngstown, Ohio

### INGOT, ALUMINUM (ALLOYS)

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div. ASARCO
120 Broadway
New York 5, N. Y.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### INGOT, MAGNESIUM (ALLOYS)

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Co.
Magnesium Department
Midland, Michigan

### INGOT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### IRRIGATION PIPE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### LUBRICANTS, CASTING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

### LUBRICANTS, EXTRUDING

Acheson Colliods Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

### LUBRICANTS, FORGING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

### LUBRICANTS, METALWORKING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Scott Chemical Corp.
510 W. Garfield
Glendale 4, Calif.

### MAINTENANCE MATERIALS, PAINT SPRAY BOOTH

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

### NAILS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### NUTS

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

### PARTING COMPOUNDS

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

### PIG, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### PIPE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Precision Extrusions, Inc.
721 E. Green Ave.
Bensenville, Ill.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### PLASTIC CAPS, INSERTS

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

### PLASTIC GLIDES, RUNNERS FOR WINDOWS, DOORS, SCREENS

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

### PLATE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Fairmont Aluminum Company
Fairmont, West Virginia

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Rockingham Road
Davenport, Iowa

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## ALUMINUM EXTRUSION FACILITIES

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5538 North Kedzie Ave. • Chicago, Illinois • INdependence 3-7030

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Please send me complete information on Corson Industries aluminum extrusion facilities and services.

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City ..... Zone ..... State

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400 Park Avenue
New York 22, New York

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6601 W. Broad St.
Richmond 18, Va.

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701 Liberty St.
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### PLATE, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

### PLATE, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### POLISHING, BUFFING COMPOUNDS

Frederick Gumm Chemical Co., Inc.
538 Forest St.
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Alchemize Corporation
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Frederick Gumm Chemical Co., Inc.
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Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

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Refractories Div.
161 E. 42nd Street
New York 17, N. Y.

Harbison-Walker Refractories Co.
Farmers Bank Building
Pittsburgh 22, Pa.

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Kaiser Center
Oakland 12, Calif.

H. K. Porter Co., Inc.
Porter Bldg.
Pittsburgh 19, Pa.

### REFRACTORY CONES for FURNACE TAP-OUT PLUGS

Refractory Products Co.
910 Custer Ave.
Evanston, Ill.

### RIVETS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

### ROD AND BAR, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### ROD, BRAZING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Lucas-Milhaupt Engineering Co.
5040 S. Lake Drive
Cudahy, Wisconsin

Nichols Wire & Aluminum Co.
Davenport, Iowa

### ROD, WELDING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Buildings
Pittsburgh 19, Pennsylvania

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### SCREEN WIRE, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

### SCREEN WIRE, ALUMINUM, ANODIZED

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

### SCREWS, MACHINE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Southern Screw Company
Statesville, North Carolina

### SCREWS, TAPPING, ALUMINUM

Southern Screw Company
Statesville, North Carolina

### SCREWS, WOOD, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Screw Company
Statesville, North Carolina

### SHAPES, ANODIZED

Aluminum Finishing Corp.
1012 E. 21st Street
Indianapolis, Indiana

### SHAPES, ROLL FORMED

Nichols Wire & Aluminum Company
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Roll Formed Products Co.
3754 Oakwood Avenue
Youngstown, Ohio

### SHEET, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Company
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Johnston Foil Div.
Standard Packaging Corp.
6008 S. Broadway
St. Louis 11, Mo.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Conn.

Sheet Aluminum Corp.
701 Liberty St.
Jackson, Mich.

### SHEET, ANODIZED

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Aluminum Finishing Corp.
1012 E. 21st Street
Indianapolis, Indiana

City Plating & Polishing Co.
22nd & Cole Street
St. Louis 6, Missouri

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

Fairmont Aluminum Co.
Fairmont, West Virginia

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions, Inc.
North Washington Street
Magnolia, Arkansas

### SHEET, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

### SHEET, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

### SOLDER, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

### SPOOLED ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

### STRIPPERS, METAL & PAINT

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

### STRUCTURALS, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Willam L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Corson Industries
Delair, N. J.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14575 Meyers Road
Detroit 27, Mich.

Southern Extrusions, Inc.
North Washington St.
Magnolia, Arkansas

United States Extrusions Corp.
120 Old Broadway
Garden City Park, L. I., N. Y.

### THORIUM METAL

Dominion Magnesium, Ltd.
Suite 1505, 320 Bay St.
Toronto, Canada

### TOOLING PLATE, ALUMINUM

Reynolds Metals Co.
6601 W. Broad St.
Richmond 18, Va.

### TORCHES, WELDING, CUTTING

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

### TREAD PLATE, MAGNESIUM

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

### TUBED SHEET, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Olin Roll-Bond Division
East Alton, Ill.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Co.
6601 W. Broad St.
Richmond 18, Va.

### TUBE, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

William L. Bonnell Co., Inc.
Newnan, Ga.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Corson Industries
Delair, N. J.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Kawneer Company
Mill Products Div.
St. Charles, Ill.

North American Extrusions Corp.
5569 N. Riverview Drive
Kalamazoo, Mich.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Rogers Industries, Inc.
14572 Meyers Road
Detroit 27, Mich.

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas

United States Extrusions Corp.
120 Old Broadway
Garden City Park, L. I., N. Y.

Wells Aluminum Corp.
North Liberty, Ind.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

### TUBE, MAGNESIUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Metal Products Co.
Div. Dow Chemical Co.
Midland, Mich.

### TUBE, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

Wolverine Tube
Div. Calumet & Hecla Inc.
17200 Southfield Rd.
Allen Park, Mich.

### VENETIAN BLIND STOCK

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### WIRE, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

### WIRE, PRECISION SPOOLED, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Ave.
White Plains, N. Y.

### WIRE DRAWING COMPOUNDS

Grafo Colloids Corp.
Sharon, Pa.

L. R. Kerns Co.
2657 E. 95th St.
Chicago, Ill.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

## EQUIPMENT

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The Meaker Co.
1629 S. 55th Ave.
Chicago 50, Ill.

The Gilbert Tramer Co
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Cleveland, Ohio

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Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

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P. O. Box 1466
Pittsburgh 30, Pa.

Morgan Construction Co.
Worcester, Mass.

### BELT GRINDERS, ABRASIVE

Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

### BENDER, TUBE AND BAR

Wallace Supplies Manufacturing
1300 Diversey Parkway
Chicago 14, Ill.

### BILLET CUTTERS

Loma Machine Manufacturing Co.
114 East 32nd Street
New York 16, New York

Stone Machinery Co., Inc.
Manlius, New York

Ty-Sa-Man Machine Co.
Box 1269
Knoxville 1, Tenn.

### BILLET HEATERS

Ajax-Magnethermic Corp.
3990 Simon Road
Youngstown 7, Ohio

Granco, Inc.
317 32nd St., S.W.
Grand Rapids 8, Mich.

Hevi-Duty Electric Co.
Div. Basic Products Corp.
3002 W. Burleigh St.
Milwaukee, Wis.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

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2060 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

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Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

The Gilbert Tramer Co.
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Cleveland 13, Ohio

### BURNERS, OIL, GAS

E. W. Bliss Company
Canton 10, Ohio

### CASTABLES, REFRACTORIES

Babcock & Wilcox Corp.
161 E. 42nd Street
New York 17, N. Y.

### CASTING EQUIPMENT, BILLET

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

Morrison Engineering Corp.
P. O. Box 4345
Cleveland 32, Ohio

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

### CASTING MACHINES CONTINUOUS

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

### COLD DRAW EQUIPMENT

The Aetna-Standard Div.
Blaw-Knox Co.
Frick Building
Pittsburgh 30, Pa.

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Lake Erie Machinery Corp.
883 Woodward Ave.
Buffalo 17, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

### COLD DRAWING MACHINE, CONTINUOUS

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

### CUTTING MACHINES

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

## DISTRIBUTORS AND JOBBERS

**These firms warehouse most forms of aluminum—sheet, coil, rod, tube, extrusions, etc.—and are located in all major industrial areas.**

Aluminum Mill Supply Corp.
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30 Rockefeller Plaza
New York 20, N. Y.

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Page Boulevard
Springfield, Massachusetts

A. M. Castle & Co.
3400 N. Wolf Road
Franklin Park, Ill.

Chase Brass & Copper Co.
Waterbury 20, Conn.

Copper & Brass Sales, Inc.
6555 E. Davison
Detroit 12, Mich.

Peter A. Frasse and Company
17 Grand Street
New York, N. Y.

Fromson Orban Co., Inc.
261 Madison Ave.
New York 16, N. Y.

J & L Steel Warehouse Div.
545 W. McCarty
Indianapolis 5, Ind.

E. M. Jorgensen Company
10650 South Alameda
Los Angeles, California

Perry Kilsby, Inc.
2501 S. Malt Ave.
Los Angeles 22, Calif.

A. B. Murray Co., Inc.
P. O. Box 476
Elizabeth, N. J.

Precision Steel Warehouse, Inc.
3500 North Wolf Road
Franklin Park, Illinois

Production Metals, Inc.
299 Pavonia Ave.
Jersey City 2, N. J.

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Joseph T. Ryerson & Son, Inc.
16th and Rockwell Streets
Chicago 80, Illinois

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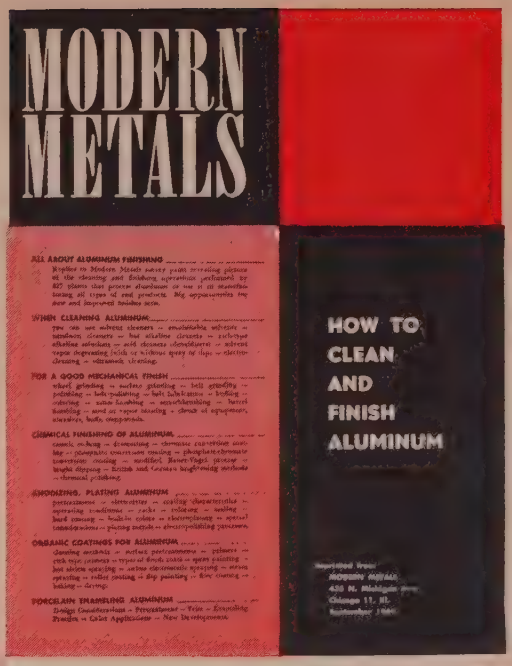


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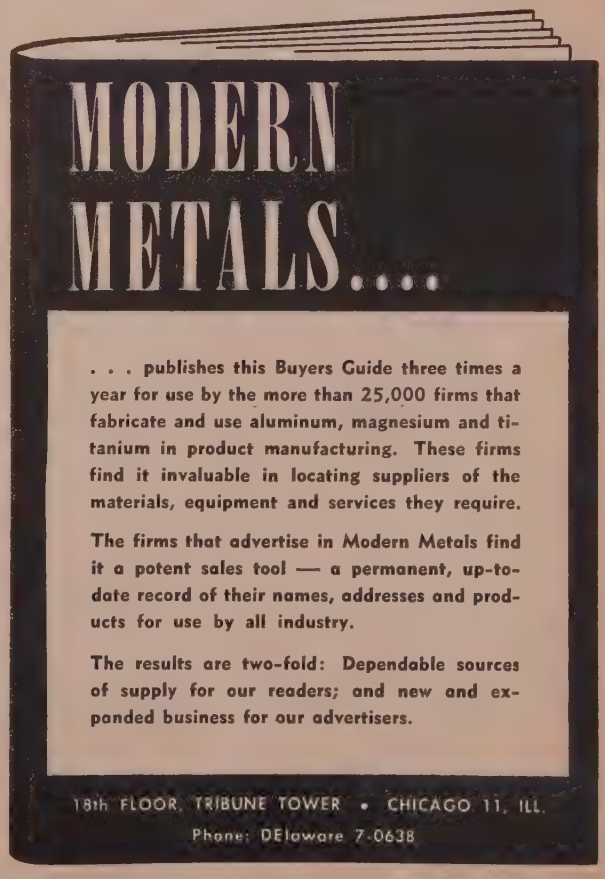
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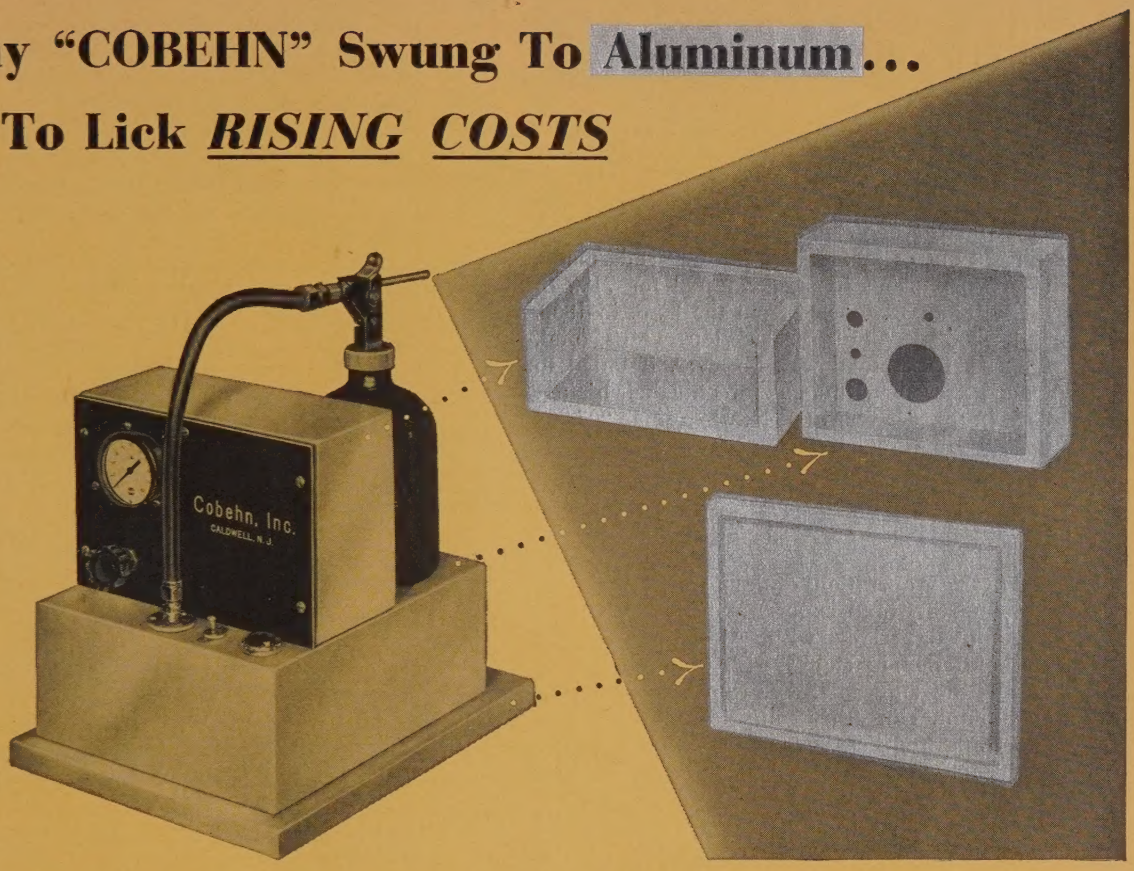


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# Looking Ahead

**Exports loom large** as a major outlet for excess primary aluminum capacity in the U. S. Last year, exports totaled nearly 170,000 tons — a soaring 94% increase over the 87,400 tons of aluminum shipped out of the country in '58. Crude metal, meaning pig and ingot, accounted for 71% of the aluminum exported from the U. S. in 1959, and about 60% of the previous year's total. High as 1959's total was, however, it failed to set a record. Aluminum exports hit their highest level in the war year of 1944, when some 207,800 tons of aluminum were exported. But postwar exports generally remained low until 1956, when nearly 73,000 tons of U. S.-made aluminum left our shores.

**Intensified overseas operations of** the primary producers will probably hold exports at high levels from now on — especially with Alcoa, Kaiser and Reynolds tied in closely with aluminum firms in England and Italy. Per capita consumption of aluminum in other countries is on the rise, and U. S. producers are out to capture a bigger chunk of the business. So, barring another shortage — which looks unlikely at present — shipments of aluminum to world markets should continue to gain in the years ahead.

**Last year's increase in exports** helped the primary producers boost output to the new record of 1,953,039 tons — a 25% increase over the 1958 total, and 16% better than the previous high of 1,678,954 tons produced in 1956. But booming demand for aluminum in domestic markets provided the big impetus that kept primary aluminum plants running at an average of 82% of rated capacity through the year.

**One indication of strengthening demand** for aluminum was Alcoa's decision late last month to reactivate an idle potline at its Wenatchee, Wash., smelter, raising the company's operating rate to 86% of installed capacity. The line had been idle since early in 1958. "While the demand picture remains spotty," explained Wenatchee Works manager W. N. Farquhar, "the general outlook now appears to promise improvement in the months ahead." Alcoa has also revealed that it will begin operations in June at its new 150,000-ton smelter at Warrick, Ind. A hot metal deal with General Motors (see story on page 92) plays an important role in the decision to get the new smelter running this spring.

**Aluminum distributors** expect their sales in the first half of 1960 to show a 14% gain over the same period last year. This was the report coming out of the winter meeting of the board of directors of the National Association of Aluminum Distributors. The warehousemen averaged a 24% increase in aluminum sales in 1959 compared with 1958, the board announced, and December sales were 29% higher than the year earlier level. Significantly, the 14% gain forecast for the first half of 1960 is exactly the same as the group's prediction one year ago — which turned out to be on the conservative side.

**Alcoa continues to step up** its invasion of the building products field. It recently acquired Cupples Products Corp., big St. Louis-based producer of aluminum building products (see "News"), and now plans to set up a completely new building product sales organization. All of Alcoa's sales, design, development and promotional efforts in all phases of building have been consolidated in one group headed by M. C. Schoetz, formerly manager of architectural sales. "This innovation is designed to accelerate Alcoa's effort to advance aluminum's growing acceptance by the building industry," explained F. J. Close, vice president and general sales manager. "Our central group will aim for increased technical design aid for designers and builders and greater promotional activity and sales effort for structures of all types." In other words, it will add up to more aluminum — and stiffer competition — in the building products business.

**Short term outlook for titanium** is far from rosy, but industry spokesmen seem to be heartened by the long range prospects. The Business and Defense Services Administration of the U. S. Department of Commerce expects shipments of titanium mill products to drop to about 5.2 million pounds in 1960, compared with an estimated 6 million in '59. Main reason: Cancellation or stretchout of military aircraft programs (the B-70 program, in particular) that were slated to consume substantial amounts of the metal. Industry men agree that shipments will slip somewhat this year, but expect some improvement when missile programs now in the development stage go into production. They also point out that 15% of last year's shipments were for commercial aircraft, while another 15% went into missiles. And just around the corner, they claim, are the "promising chemical process industries" in which titanium can give stainless steel and other ferrous alloys a tough battle.

**The biggest titanium fabricator,** Titanium Metals Corp. of America, has no plans to retrench, despite talk of declining demand this year. A spokesman for TMCA noted that prices of the metal were reduced seven times during capacity operations, and that trimming of the price has continued "with the result that the market base for titanium is actually broader than ever before. Unfortunately," he adds, "almost every one of (the new) programs is now in the development stage and won't consume tonnage metal until production begins."

*— The Editors*

*A 63S Alloy aluminum extrusion, actual size, extruded on a 14-mandrel die. Samples of this extrusion on request*

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